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Commonwealth of Massachusetts
Division of Occupational Safety

Asbestos Associated Project Worker Training

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ASBESTOS ASSOCIATED PROJECT WORKER

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SECTION 1: INTRODUCTION

1.1 PURPOSE OF TRAINING

This training will provide the 16 hour Asbestos Associated Project Worker Training for public sector employees in Massachusetts, in accordance with the training requirements set forth in the state regulation 453 CMR 6.00. Emphasis will be placed on requirements which apply to the public sector, with reference to the OSHA standards where necessary, rather than in greater detail when such training is provided to the private sector by certified training providers in Massachusetts.

An asbestos associated project is a work operation involving the disturbance of three or fewer linear or square feet of asbestos material, and does not have as its principal purpose the removal, enclosure or encapsulation of asbestos containing material. Such activity shall include, but not be limited to, general building maintenance, electrical and low voltage wiring, plumbing, carpentry, masonry, HVAC and heating service.

This training will provide the information necessary and step by step procedures to safely perform asbestos associated projects.

1.2 SCOPE OF TRAINING

The specific areas that must be covered during sixteen-hour training listed at 453 CMR 6.10(4)(h) are as follows:

Training shall include, but not be limited to:

1. Background information on asbestos
2. Potential health effects related to asbestos exposure
3. Recognition of damage, deterioration and delamination of ACM
4. Employee personal protective equipment
5. Personal hygiene
6. Proper methods of handling asbestos material
7. Relevant federal, state and local regulatory requirement
8. Hands-on training

Annual refresher training is recommended but not required for asbestos-associated project workers. Certificates of completion are provided to the employee by the training facility. A copy of the certificate should be maintained in a central location of the administrative office of each employer as part of the Asbestos Management Program or Operations and Maintenance Program.

1.3 ASBESTOS ASSOCIATED PROJECT WORK

Asbestos-associated projects are sometimes referred to as small scale, short duration (SSSD) projects. The comparable OSHA classification of this work is considered Class

III work, and requires training equivalent to the asbestos associated project worker. SSSD activities can be defined by the following considerations: (a) Removal of small quantities of ACM only if required in the performance of another maintenance activity ***not intended as asbestos abatement***, (b) removal of asbestos containing material not to exceed amounts greater than those which can be contained in a single glove bag. This type of asbestos removal is not a means by which full-scale asbestos abatement can be accomplished. The intentional disturbance of ACBM should be limited to the repair or removal of small areas of significantly damaged ACBM or to small areas where removal is necessary to make maintenance or minor renovation activities easier. Some small scale, short duration activities may be subject to asbestos NESHAP requirements if enough ACBM will be disturbed during a calendar year.

Regulatory Definition:

(1) The Division of Occupational Safety also defines Asbestos Associated Projects in 453 CMR 6.02: "a work operation involving the disturbance of three or fewer linear feet of asbestos surfacing located on pipes, ducts or wires or three or fewer square feet of asbestos surfacing located on structures or components other than pipes, ducts or wires and which does not have as its principal purpose the removal, enclosure or encapsulation of asbestos or asbestos-containing material. Such activity shall include but not be limited to general building maintenance, electrical and low voltage wiring, plumbing, carpentry, masonry, HVAC and heating service."

(2) In Appendix C to Subpart E of the AHERA regulation, E.P.A. details the types of work that can be considered SSSD. Small-scale, short duration activities are tasks such as, but not limited to:

a. Removal of asbestos-containing insulation on pipes
b. Removal of small quantities of asbestos-containing insulation on beams or above ceilings
c. Replacement of an asbestos-containing gasket on a valve
d. Installation or removal of a small section of drywall
e. Installation of electrical conduits through or proximate to ACM

Such work *may not exceed* amounts greater than those which can be contained in a single prefabricated mini-enclosure. Such an enclosure shall conform spatially and geometrically to the localized work area, in order to perform its intended containment function.

The building owner should keep in mind that compliance is required with both federal regulations and the state regulations, with respect to the amount of ACM that can be removed during SSSD activities, and the work practices which must be observed, including appropriate training.

Persons who conduct asbestos associated project work must have received the minimum training of 16 hours. All employees who perform small scale asbestos projects shall be provided with personal protection, including respirators and protective clothing. Both the

building owner and the person conducting the work are responsible for ensuring that the safe work practice requirements are met.
These include:

1) Exclude all persons not directly involved in the removal from the work area. This includes using physical barriers as necessary to limit access while work is underway.
2) Construct dust tight barriers to ensure that any asbestos fibers release during the removal are contained within the work area. Glove bags and prefabricated mini-enclosures are permitted.
3) Wet any ACM with amended water before disturbing, and keep it wet throughout the work operation.
4) Any friable ACM exposed as a result of the work operation shall be suitable enclosed or encapsulated.
5) HEPA vacuum and wet clean to decontaminate the work area and any equipment until all surfaces are free of visible debris
6) Containerize, label, transport and dispose of ACM according to all state and federal regulations
7) Visually inspect all surfaces within the work area for dust, debris and residue. The inspection shall be conducted by the building owner or person with a minimum of 16 hours training. The work area will be repeatedly cleaned until *no visible debris* criteria is achieved.

The asbestos management plan should include all records of any small scale or asbestos associated projects performed in the building. This includes **(1)** proof that the person(s) conducting the work were properly trained (such as copy of training certificate or certification card), **(2)** methods used, **(3)** date and location of work, **(4)** documentation of the visual inspection (name of inspector and date), and **(5)** name and place of disposal (copy of waste shipment record). Forms are included for such activities.

SECTION 2: TYPES AND USES OF ASBESTOS IN BUILDINGS

2.1 HISTORY OF ASBESTOS

Asbestos is a naturally occurring mineral found in rock, which once extracted from the earth, is crushed, milled and graded. The word "asbestos" is derived from the Greek language. The Greeks admired the "miracle mineral" because of its softness and flexibility and its ability to withstand heat. The Greeks used asbestos much like cotton, spinning and weaving it into cloth. Asbestos was not widely available anywhere in the world until the late 1800s, when major deposits were found in Canada. Thereafter, asbestos was used to make thermal insulation for boilers, pipes, and other high temperature applications, and was also used as a fireproofing and reinforcement material. During World Wars I and II, the military used asbestos extensively in ships and other applications.

Asbestos has been used in thousands of products because it is

- plentiful,
- inexpensive,
- strong,
- does not burn
- is resistant to chemical corrosion.
- does not readily conduct heat or electricity

For these reasons, asbestos proved to be most useful in the construction industry. Commercial usage of asbestos in buildings increased greatly thereafter (1945-1980), but growing concerns about the health risks associated with asbestos exposure resulted in a voluntary reduction in the use of asbestos beginning in the 1970s.

A comprehensive list of common uses of asbestos in buildings can be found at the end of this packet.

Asbestos-containing building materials (ACM) include fireproofing, insulation acoustical and soundproofing material, asphalt, vinyl, cement, roofing shingles, wallboard, and siding. In schools, ACM is commonly found in flooring, vinyl base, mastic, roofing materials, gaskets in heating and air-conditioning equipment, ceiling panels and tiles, joint compound, window putty, plaster, pipe and boiler insulation, duct-wrap insulation, duct joint tape, duct vibration dampening cloth, fireproofing on structural members, fire brick for boilers, fire doors, cement pipes, panels and acoustical spray-on.

2.2 TYPES OF ASBESTOS

Asbestos is divided into two groups: serpentine and amphibole. The only type of asbestos in the serpentine group is *chrysotile* or white asbestos because of its natural color. **Chrysotile** is the most common type of asbestos found in buildings in the United States, accounting for about 95 percent.

The amphibole group contains five types of asbestos: amosite, crocidolite, anthophyllite, tremolite, and actinolite. *Amosite* or brown asbestos is found in buildings and *crocidolite* or blue asbestos has been used in high-temperature insulation products and chemical-resistant surfaces, such as laboratory tables. The remaining three types of asbestos in the amphibole group -- Anthophyllite, Tremolite, and Actinolite -- are rare and have little commercial value. They are occasionally found as contaminants or minor constituents in asbestos-containing materials.

The crystals of asbestos in both groups form long, thin fibers of material, each of which consists of hundreds of thousands of fibers. Each fiber bundle contains even tinier fibers, invisible to the naked eye. These fibers become airborne when the ACM deteriorates or is compromised. Due to the cleavage properties of the amphiboles, i.e. the tendency to break into smaller and smaller needle-like fragments, amosite asbestos has been considered more harmful. However, all asbestos minerals should be considered potential health hazards.

2.3 CATEGORIES OF ASBESTOS

2.3.1 Friable vs. Nonfriable ACM

Friable ACM will release fibers into the air more readily than nonfriable ACM. Therefore, the AHERA Rule differentiates between friable and nonfriable ACM. The regulations define friable ACM as **material that may be crumbled, pulverized, or reduced to powder by hand pressure when dry.** Friable ACM also includes previously nonfriable material when it becomes damaged to the extent that when dry it may it may be crumbled, pulverized, or reduced to powder by hand pressure. ***Undamaged non-friable ACM should be treated as friable if any action performed on the material will make them friable.***

EPA identifies three categories of ACM:

- **Surfacing Materials** -- Interior ACM that has been sprayed on, troweled on, or otherwise applied to surfaces (structural members, walls, ceilings, etc.) for acoustical, decorative, fireproofing, or other purposes. This includes acoustical plaster, hard plasters (wall or ceiling), fireproofing insulation, spray-applied or blown-in thermal material, joint or patching compound (wall or ceiling), and textured paints or plasters.

- **Thermal System Insulation** – Insulation used to control heat transfer or prevent condensation on pipes and pipe fittings, boilers, breeching, tanks, ducts, and other parts of hot and cold water systems; heating, ventilation, and air conditioning (HVAC) systems; or other mechanical systems. These insulation materials include pipe lagging, pipe wrap, HVAC duct insulation, block insulation, cements and muds, and a variety of other products such as gaskets and ropes.

- **Miscellaneous Materials** – Other, mostly nonfriable products and materials found on structural components, structural members or fixtures, such as floor tile, ceiling tile, pressure. The characteristic of friability shall apply to the asbestos material and is not influenced or affected by coverings, coatings or other means of separating asbestos materials by hand.

- Non-Friable materials are differentiated as follows:

Category I Non-Friable – packings, gaskets, resilient floor coverings, asphalt roofing products containing more than 1% asbestos

Category II Non-Friable – any other material not listed in Category I which contains more than 1% asbestos

2.4 USES OF ASBESTOS

There was widespread use of asbestos largely because it was plentiful, readily available, inexpensive, strong, fire resistant, poor conductor of heat and electricity, and chemically resistant. Products made with asbestos are often referred to as asbestos-containing materials (ACM). Building materials that contain asbestos are referred to as asbestos-containing building materials (ACBM).

Some of the most common uses of ACM include:

☐ **Fireproofing material** – Usually spray-applied to steel beams used in construction of multi-story buildings to prevent structural members from warping or collapsing in the event of fire.

☐ **Insulation material** – Usually spray-applied, trowel-applied, or manually installed after being preformed to fit surfaces such as pipes for thermal insulation and condensation control.

☐ **Acoustical or soundproofing material** – Trowel- or spray-applied. May also be used for decoration. Asbestos was mixed with other materials and sprayed onto ceilings and walls to produce a soft, textured look.

☐ **Miscellaneous materials** – Asbestos has been added to asphalt, vinyl, cement and other materials to make products like roofing felts, exterior siding and

roofing shingles, wallboard, pipes for water supply, combustion vents, and flues for waste gases and heat. Fibers in asbestos cement, asphalt, and vinyl materials are usually firmly bound into materials in good condition and typically will be released only if the material is damaged mechanically – for example through drilling, cutting, grinding, or sanding. In addition, asbestos in roofing shingles and siding exposed to weathering may slowly deteriorate and has the potential to release fibers.

Examples of the more common ACM found in buildings are flooring, vinyl tiles, mastic, roofing materials, gaskets in heating and air-conditioning equipment, ceiling panels and tiles, wallboard, joint compound, plaster, pipe and boiler insulation, duct-wrap insulation, duct joint tape, duct vibration dampening cloth, fireproofing on structural members, fire brick for boilers, fire doors, acoustical spray-on, cement pipes, and panels.

Hundreds of thousands of tons of asbestos containing products are imported into the United States each year. The following chart identifies these products and the amounts known through 1997. Not all of these materials will be used in buildings, but a significant amount will, with the primary area of concern being floor tiles.

Sample List of Suspect Asbestos-Containing Materials

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Flooring Backing
- Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster
- Textured Paints/Coatings
- Ceiling Tiles and Lay-in Panels
- Spray Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials (for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Hoods/Table Tops
- Laboratory Gloves
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections
- Cooling Towers
- Pipe Insulation (corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electrical Cloth
- Electrical Wiring Insulation
- Chalkboards
- Roofing Shingles
- Roofing Felt
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives
- Wallboard
- Joint Compounds
- Vinyl Wall Coverings
- Spackling Compounds

SECTION 3: HEALTH EFFECTS OF ASBESTOS

3.1 HAZARDS AND RISKS OF ASBESTOS EXPOSURE

The health effects associated with asbestos exposure have been studied for many years. It has been well demonstrated that most asbestos-related illnesses are dose-response related (i.e., the greater the exposure to airborne asbestos fibers, the greater the risk of developing an illness).

The presence of asbestos in a building does not mean that the health of building occupants is endangered. ACM which is in good condition, and is not damaged or disturbed, is not likely to release asbestos fibers into the ambient air. When ACM is properly managed, release of asbestos fibers into the air is prevented or minimized, and the risk of asbestos-related disease can be reduced to a negligible level. Based on available data, the average airborne asbestos levels in buildings seem to be very low. Accordingly, the health risk to most building occupants also appears to be very low. [EPA #TS-799, 20T-2003, July 1990 (Green Book)]

Almost daily, we are exposed to some prevailing level of asbestos fibers in buildings or experience some existing level in the outdoor air. Some fibers that are inhaled remain in the lungs. Brief "bursts" of exposure, when added to the background level, increase the potential to cause or trigger the development of an asbestos related disease. These brief bursts of exposure occur in many ways. For example, when a carpenter drills a hole in an asbestos fire door without taking any precautions, an increased amount of asbestos may be released into the air. The more often these bursts of exposure occur, the greater the risk of breathing asbestos fibers.

Although in general the risk is likely to be negligible for occupants, people most at risk for this additional exposure are maintenance and custodial workers whose jobs may bring them in close proximity to asbestos in buildings. For these workers a complete and effective operations and maintenance (O&M) program can greatly reduce asbestos exposure

It is important to recognize that the majority of people who have developed diseases because of asbestos exposures are former asbestos workers. These workers were frequently exposed to high levels of asbestos fibers each working day, with little or no protection. Today's asbestos maintenance workers and AHERA-trained asbestos abatement workers are trained to follow specific work practices and wear appropriate protection, including respirators, to minimize the risk of exposure. However, increased risk may occur when a worker who does not use a respirator or follow specific work practices disturbs any ACM.

While studies of asbestos workers and laboratory animals clearly reveal that asbestos is hazardous, the risks associated with low-level, non-occupational

exposure (i.e., an occupant of a building who is not actually disturbing the asbestos) have not been directly demonstrated. Estimating low-level risks from exposure data is not a straightforward process, and the validity of current methodologies is questionable.

Based on a thorough review of the literature available on the health effects of asbestos, the National Institute for Occupational Safety and Health (NIOSH) has concluded that there is no level below which the risks of contracting an asbestos-related disease are zero. This means that there is no established safe level of exposure to asbestos.

3.2 ASBESTOS RELATED DISEASES

The main route whereby asbestos enters the body is **inhalation**, although some may enter by ingestion. Most commonly, air is breathed in through the nose and mouth, continuing into the windpipe (trachea). The trachea splits into two smaller airways called bronchi. Each bronchus divides into smaller and smaller tubes that terminate in the lungs as air sacs called alveoli. It is in these air sacs that respiration occurs. Oxygen is absorbed into tiny blood vessels (capillaries), and waste gases, such as carbon dioxide, pass out of the blood and exhaled.

The body has several mechanisms to "filter" the air it breathes. First, large particles are removed in the nose and mouth. Many smaller particles are caught on the mucus-coated walls of the airway tubes. These airways have "hairy" linings (ciliated cells) that constantly propel mucus upward. Particles caught in the mucus are swept up into the back of the mouth. From there they are swallowed or expelled (spit out). Unfortunately, cigarette smoking temporarily paralyzes these hair-like cells, disabling one of the body's natural defenses against unwanted dust or fibers. Smoking and asbestos exposure produce a **synergistic effect**, significantly increasing the risk of asbestos related disease by **50 to 100 times.**

The time between the exposure to asbestos fibers and the actual onset of an asbestos related disease is called a **latency period.** Depending on the amount and duration of exposure, this latency period can range from 10 to 40 years.

Despite natural bodily defenses, some dust particles inevitably reach the tiny air sacs in the lungs. When this occurs the human immune system dispatches large cells called macrophages to engulf the particles and "digest" them. Because asbestos is a mineral fiber, the particles are not often digested. The macrophages deposit a coating on the inhaled particles and the formation of scar tissue around them begins. Pleural plaques and asbestosis result from the buildup of this scar tissue in the lungs.

If the body's defenses fail to control or remove asbestos fibers that enter the lungs, the risk of developing an asbestos-related disease increases. Asbestos-related diseases include asbestosis, lung cancer, mesothelioma, and other cancers.

- **Asbestosis** -- Asbestosis is a disease characterized by lung scarring. The build up of scar tissue results from the body's defense mechanisms trying to isolate the asbestos fibers which could not be digested. This scarring reduces lung elasticity -- the ability to inhale and exhale in response to muscular contractions of the diaphragm -- and makes breathing very difficult. Asbestosis is most common among workers who have been exposed to large amounts of asbestos fibers over a period of time. It is a serious disease and, in those persons exposed to high levels of asbestos, can eventually lead to disability or death. All forms of asbestos are suspected to have the potential to cause asbestosis. Like all diseases associated with asbestos exposure, it may take many years for the disease to show up. The typical *latency period for asbestosis is 15 to 30 years.* Available data indicate that the frequency of occurrence of asbestosis rises and the disease worsens with increasing dust exposure. The Occupational Safety and Health Administration (OSHA) Asbestos Standards were developed to minimize the incidence of asbestosis among asbestos workers by reducing their exposure to asbestos.

- **Lung Cancer** -- As with asbestosis, there appears to be a dose-response relationship between asbestos exposure and lung cancer. In addition, lung cancer arising from asbestos exposure also has a *latency period before development -- typically 30 years or longer.* The risk of contracting lung cancer as a result of exposure to asbestos increases if the worker is a cigarette smoker. Cigarette smokers who are exposed to asbestos are over 50 times more likely to develop lung cancer than the normal, non-smoking population. As a result, a program to help workers stop smoking and an asbestos operations and maintenance program will help reduce the risk of lung cancer among asbestos maintenance workers.

- **Mesothelioma** -- Mesothelioma is a cancer that occurs in the chest cavity lining or in the abdominal (stomach) lining. This type of cancer spreads rapidly and is always fatal. Cases of mesothelioma have been found in people who have had a limited exposure to asbestos. The onset of this disease appears to be independent of smoking behavior but related to dose and to time from first known asbestos exposure. Mesothelioma tends to have a long *latency period -- usually 30 to 40 years.*

- **Other Diseases** -- Several other diseases seem to occur more frequently among people who have been exposed to asbestos. These include cancer of the esophagus, stomach, colon, and pancreas; pleural (fibrous) plaques; pleural thickening; and pleural effusion.

Asbestos fibers accumulate in the lungs. As exposure increases, the risk of disease also increases. The risks of contracting any of these diseases make it extremely important that asbestos maintenance workers utilize proper work practices and respiratory protection.

3.3 PROTECTION FROM DISEASE

Airborne Asbestos Concentrations

The acceptable standard for “clean air” is .01 fibers per cubic centimeter of air. This is the air that the average person breathes. Employees working in and around asbestos are permitted to breathe significantly more fibers due to occupational exposure before regulations mandate the use of respiratory protection. This is called a permissible exposure limit (PEL).

EPA permissible exposure limit (PEL) is **.2** f/cc (fibers per cubic centimeter).
This means that .2 (2/10) of a fiber is present in each cm^3 of air. [A cubic centimeter is about a 1 inch cube.]

There are 1,000 cm^3 in 1 liter of air. So we would be breathing in [.2 x 1,000] or **200** fibers per liter of air.

The average person breathes in 4 liters of air per minute. So we would be breathing in [4 x 200] or 800 fibers per minute; 48,000 fibers per hour; and over the course of an 8 hour day **384,000** fibers.

This standard mandates that exposure to airborne concentrations of asbestos greater than the PEL of 384,000 fibers over 8 hours requires the use of respirators.

It is apparent from the above numbers why it is essential to use safe work practices and engineering controls to keep the airborne asbestos concentration low and prevent reentry of these fibers into the environment, as well as the use of personal protective equipment if the concentration is suspected to be high or is unknown.

(1) Safe Work Practices

The specific work practices that must be followed when routine maintenance activities are being conducted depend on the likelihood that the activities will disturb the ACBM and cause fibers to be released. This is the first line of defense for protection from exposure to airborne asbestos fibers, and ultimately asbestos related diseases.

Use work practices or other controls, such as wet methods (damp mopping and dusting), protective clothing, HEPA vacuums, as necessary to inhibit the spread of any released fibers. Clean all fixtures or other components in the immediate work area.

During renovation activities, abatement work may be conducted during that time. Such areas will have signs posted to prevent entry by unauthorized persons. Entry

into the area will be restricted to persons necessary to perform the project. Be sure to observe these warnings.

Be aware of any other potential hazards in the work area:

- Slips, trips and falls--extension cords, wet areas
- Ladders/scaffolds—good condition and secured
- Electrical—GFCI and lockout/tagout
- Confined spaces in tunnels or crawl spaces
- Burns from high temperature pipes/heat related hazards
- Cuts and punctures from saws, retractable knives, cutting metal jackets

(2) Personal Hygiene

Persons conducted asbestos associated project work must decontaminate themselves and their equipment properly upon completion of work, and before leaving the work area. This procedure is covered in detail in the Glovebag Procedure. Washing hands, face and wetting hair after completing work will help minimize contamination. When the decontamination process is not followed, the chances of spreading contamination to the worker's car, home, and family are greatly increased.

In the work area, certain activities are prohibited:

- No eating or drinking
- No chewing gum
- No smoking
- No applying of makeup

(3) Respiratory Protection

Any employee who works in an environment where fiber levels are at the permissible exposure limit or higher or who wears a negative-pressure respirator as part of his or her job must participate in a respiratory protection program. The only way to determine whether these fiber levels exist is to collect air samples during projects that disturb ACBM. In an O&M program, the use of negative-pressure respirators will make it necessary for most custodial and maintenance workers to participate in both the medical surveillance program and the respiratory protection program. Even if fiber levels are below the permissible exposure limit described above, it is strongly suggested that an employer establish these programs and require that employees wear respirators any time they are likely to disturb ACBM.

(4) Medial Monitoring

The OSHA Asbestos Standard for the Construction Industry and the EPA Worker Protection Rule explain when employees are required to wear a negative-pressure respirator and must be involved in a medical surveillance program (see also OSHA

Asbestos Standard for General Industry). The purpose of a medical surveillance program is to determine whether or not an employee is healthy enough to wear a respirator and to detect any health changes in an employee's body resulting from working in asbestos-contaminated areas. Changes in health may indicate the onset of an asbestos-related disease. Examinations must include:

- -- a medical and work history;
- -- a physical exam with special emphasis directed to the respiratory, cardiovascular and gastrointestinal systems;
- -- completion of a respiratory disease questionnaire
- -- optional pulmonary function test

The initial and followup medical questionnaires that must be used are included at the end of section 5. Medical clearance to wear a respirator must be indicated on a form similar to the sample included in section 5.

Employers are required to keep medical records for the employee's term of employment plus 30 years.

SECTION 4: RECOGNIZING DAMAGE, DETERIORATION AND DELAMINATION OF ACM

4.1 DEFINITIONS/DESCRIPTIONS

An assessment of the condition of asbestos containing materials will take into consideration these three factors, along with the type of material (friable, nonfriable, TSI, surfacing, miscellaneous), amount of the material, and the potential for further disturbance.

Damage, Deterioration and Delamination may be **localized** (confined to one area) or **distributed** (a large area encompassing many small areas).

Material with *one or more* of the following characteristics is considered **DAMAGED**:

- the surface crumbling, blistered, water stained, gouged, marred or otherwise abraded over ***less than one tenth*** of the surface if the damage is evenly distributed, OR ***less than one quarter*** if the damage is localized;
- thermal system insulation with a few water stains or ***less than one tenth*** of the insulation with missing jackets; ☐ crushed insulation or water stains, gouges, punctures or mars on ***up to one tenth*** of the insulation if the damage is evenly distributed OR ***up to one quarter*** if the damage is localized.

A visual description of localized and distributed damage is included in this section.

Material with *one or more* of the following characteristics is considered **SIGNIFICANTLY DAMAGED**:

- The surface crumbling or blistered over ***at least one tenth*** of the surface if the damage is evenly distributed OR ***at least one quarter*** if the damage is localized; ☐ missing jackets on ***at least one tenth*** of the piping or equipment; ☐ crushed or heavily gouged or punctured insulation on ***at least one tenth*** of pipe runs/risers, boiler, tank, duct, etc. if the damage is evenly distributed (OR ***at least one quarter*** if the damage is localized);
- One tenth (OR one quarter if localized) of material hanging from the surface, deteriorated, or showing adhesive failure;
- Water stains, gouges, or mars over at least one tenth of the surface if the damage is evenly distributed OR one quarter if the damage is localized.

Accumulation of powder, dust or debris similar in appearance to the suspect material on surfaces beneath the damaged area can be used as confirmatory evidence.

Damage can be caused by physical contact, accidental or deliberate. Evidence of such disturbance includes:

- Finger marks in the material

- Graffiti
- Pieces dislodged or missing
- Scrape marks from movable equipment or furniture
- Accumulation of friable material on floors, shelves or other horizontal surfaces

Deterioration may result from environmental factors which affect the cohesive strength of the asbestos-containing material. Evidence of deterioration may include:

- Accumulation of dust on the surface of the ACM
- Separating of the ACM into layers, as pipe insulation
- Dust is released when the material is lightly brushed or rubbed

Delamination may result when environmental factors affect the strength of the bonding of the ACM to the substrate. This is a particular problem in areas where the substrate is a very smooth concrete slab. Evidence of delamination includes:

- ACM pulls away from the substrate and hangs loosely
- Debris falls on the floor exposing the substrate, as surfacing material

ACM "gives" under slight hand pressure, moving up and down

The potential for disturbance is ranked **High, Moderate or Low**, based on the potential for either damage or significant damage according to the factors listed below.

4.2 FACTORS AFFECTING CONDITION

1) **Water Damage**: from roof leaks, particularly in buildings with flat roofs or a concrete slab and steel beam construction. Skylights can also be significant sources of leaks, along with plumbing leaks. Water or high humidity in the vicinity of pools, locker rooms and lavatories can also contribute to leaks. Look for visible signs of water damage:
    - Discoloration or stains on ACM
    - Stains on adjacent walls or floors
    - Buckling of walls or floors
    - Pieces of ACM have separated into layers or fallen down

2) **Air Plenum or Direct Airstream**: An air plenum exists when the return air leaves an area through vents in a suspended ceiling and travels at low speed and pressure through the space between the actual ceiling and the suspended ceiling or ducts. Consider the following when checking for the potential for disturbance:
    - Inspect air handling or HVAC equipment rooms for accumulation of fibers, indicating the presence of ACM in the plenums
    - Look for the presence of air vents or outlets which blow air directly onto friable material
    - If frequent maintenance activities disturb the ACM in the plenum (replacing suspended ceiling tiles, changing lights or ballasts)

3) **Accessibility**: If friable ACM can be reached by building occupants or maintenance people, either directly or by impact from objects used in the area, it is accessible and subject to accidental or intentional contact and damage. Material which is accessible is likely to be disturbed in the future. Consider the following when determining accessibility:
    - Height above the floor
    - Nearness of friable ACM to heating, ventilation, lighting and plumbing systems requiring maintenance or repair

4) **Activity**: Be fully aware of occupants' use of the building. The amount of activity and type of activity conducted in the vicinity of the ACM will contribute to the high potential for manage. The level of activity in a gymnasium will affect the condition of the ACM on walls and ceilings that would not occur in a library. Consider the movement caused by the activity itself as well as:
    - High vibration from mechanical equipment, highways, airplanes, trains
    - Sound from music and noise which sets airwaves in motion and may vibrate the ACM
    - The number of persons who enter the area on a typical day

5) **Exposure**: ACM is considered exposed if it can be seen, regardless of the height of the material. To prevent exposure, a physical barrier must be complete, undamaged and unlikely to be removed or dislodged. The amount of ACM exposed to an area occupied by people will contribute to the likelihood that the material may be disturbed and determines whether the fibers can move freely through the area. ACM above a suspended ceiling is considered exposed if the space above the suspended ceiling is an air plenum. Look for the following conditions when assessing exposure:
    - Condition of suspended ceiling
    - Likelihood and frequency of access into the suspended ceiling
    - Whether the suspended ceiling forms a complete barrier or is only partially concealing the material
    - If the suspended ceiling contains numerous louvers, grids or other open spaces (it is considered exposed)

6) **Change in Building Use**: May imply significant changes in the potential for erosion or disturbance. Changes which could cause concern include:
    - Contact damage from higher activity levels,
    - Addition of machinery may induce vibration,
    - If there will be an increase in the number of occupants
    - Behavior of occupants

The more damage indicators that are present, the greater the potential for fiber release, resulting in a greater exposure risk.

4.3 Sample Collection

In some instances with asbestos associated project work, there may be a question of whether damaged material or debris on horizontal surfaces contains asbestos. Bulk analysis of a suspect material or debris is the only way to determine whether or not asbestos is present. The following guidelines for sample collection are designed to minimize damage to the ACM and subsequent fiber release.

- Collect samples from an area which may already be damaged or from visible debris in the immediate area of the suspect material
- Wear a respirator with HEPA filters
- Wet the surface of the material with a spray mist
- Invert a plastic bag over one hand, pick up a piece of material, and turn the bag right side out; seal the bag.
- Label the sample with a unique ID number, the location and date of collection
- Clean up any debris generated during sampling with wet towels and place in plastic bag.

Destructive sampling of materials which are firmly bound and in good condition should only be done by professionals trained in the proper methods of sample collection. There may be an asbestos management plan for the facility with a survey of asbestos containing materials present and their location. Check with the asbestos program manager for your facility.

Chain of custody forms must accompany any sample delivered or mailed to a laboratory for analysis. In Massachusetts, any laboratory performing asbestos analysis must be certified by the Division of Occupational Safety.

EXHIBIT D-1 REPRESENTATION OF TWENTY-FIVE PERCENT LOCALIZED DAMAGE

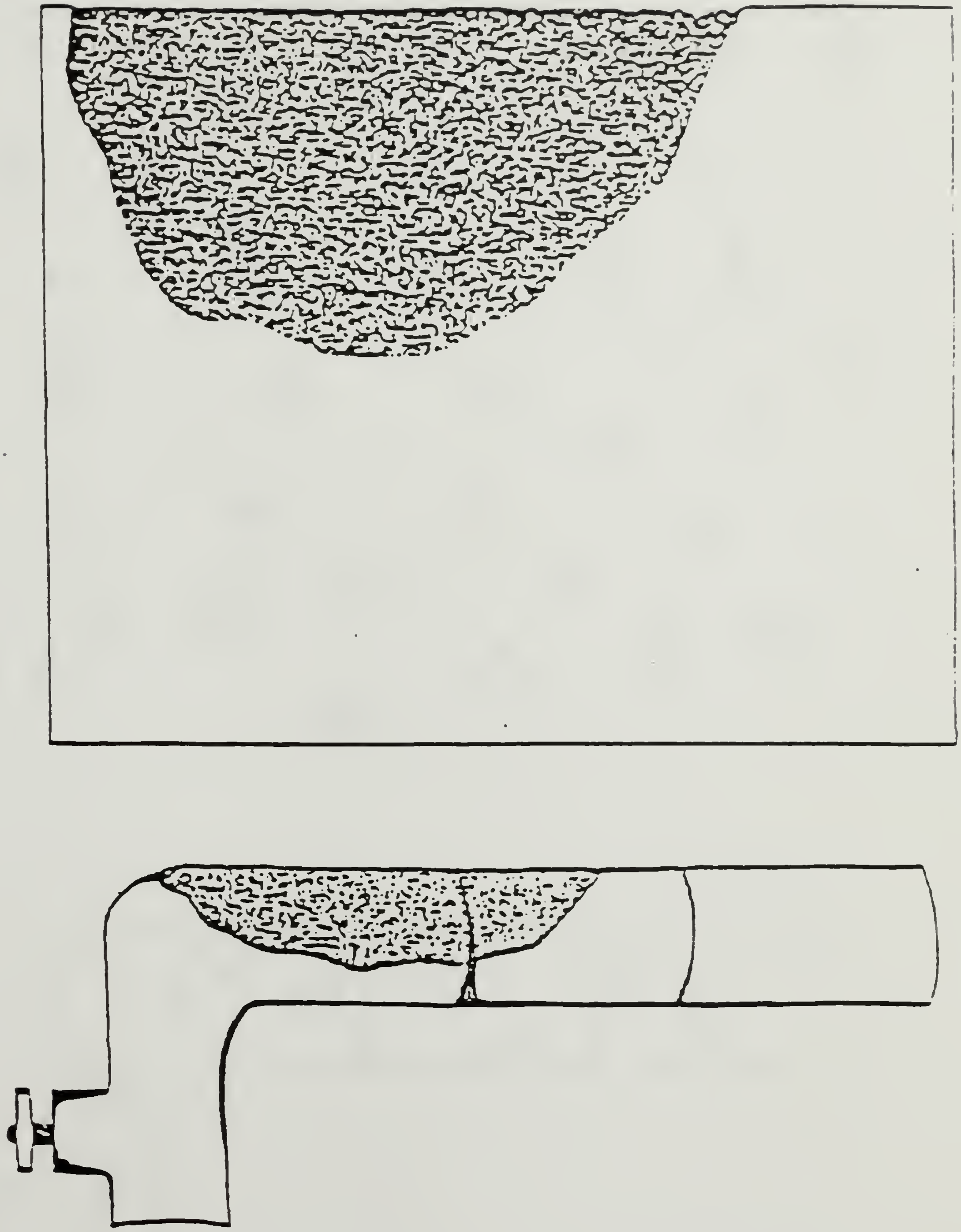
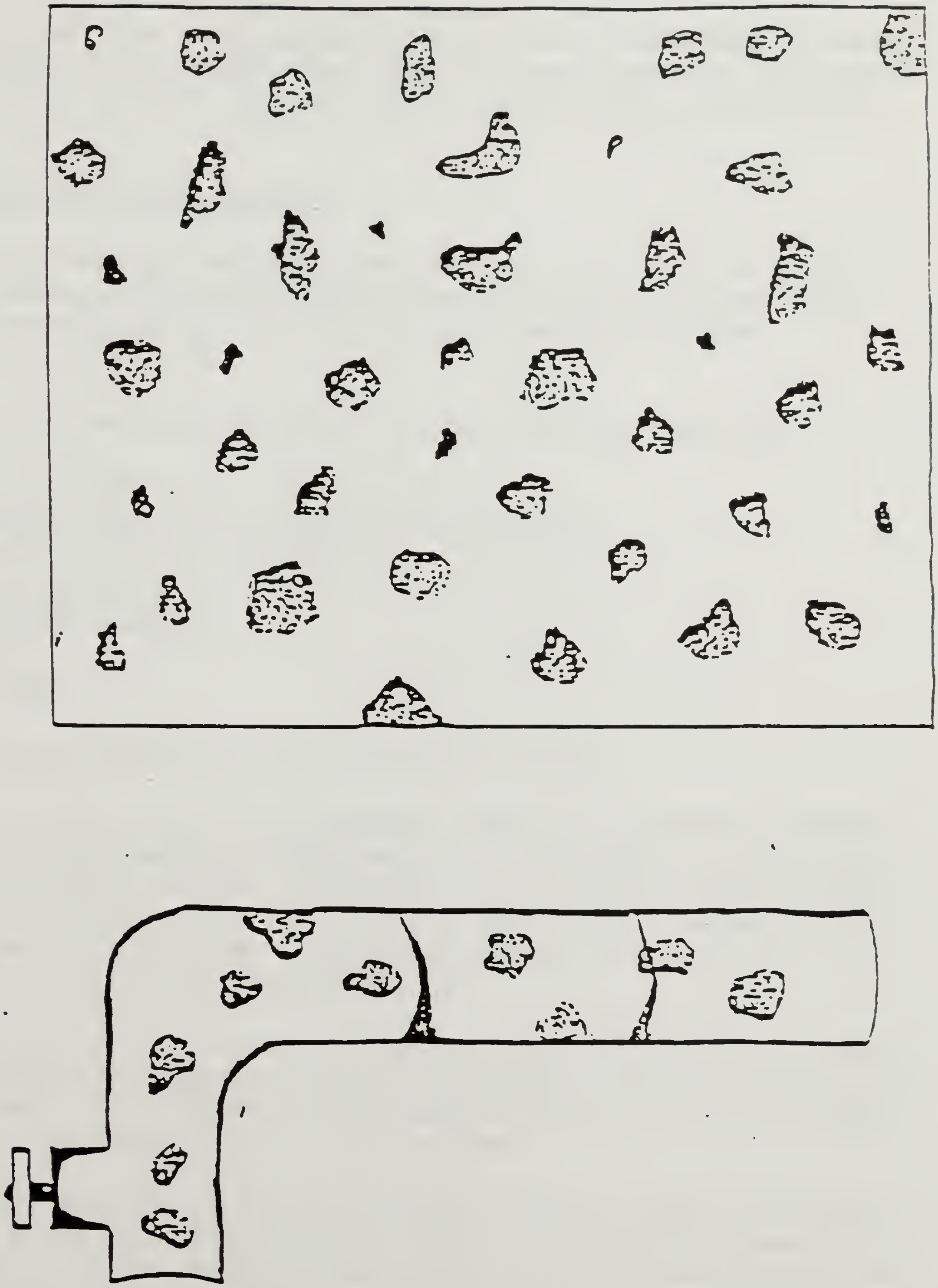


EXHIBIT D–2 REPRESENTATION OF TEN PERCENT DISTRIBUTED DAMAGE



SECTION 5: PERSONAL PROTECTIVE EQUIPMENT

When employees work in areas where asbestos fiber levels exceed permissible exposure limits or are required to wear negative pressure respirators, the employee must be monitored under a medical surveillance and respiratory protection program.

5.1 Protective Clothing/Equipment

Personal protective equipment (PPE) is required for all jobs if there is no negative exposure assessment (proof that the fiber concentrations will not exceed the PEL under very similar conditions) OR if an employee will be exposed to fiber concentrations above the PEL.

PPE for asbestos associated project work normally consists of the following:

- Disposable coveralls such as Tyvek-type suit
- Head and foot covers (may be attached to the coveralls)
- Half face respirator with HEPA filters
- Hearing protection*
- Eye protection* (goggles)
- Hard hat*
- Safety shoes*

*may be necessary depending on location of work to be done

The primary purpose for the use of protective clothing during asbestos associated projects is to keep asbestos containing debris off the body, hair and street clothing. The use of protective clothing and showers will minimize the chance spreading contamination outside the work area, such as into the worker's car and home. If street clothes are worn under the protective clothing, they should be washed separately from the rest of the household laundry.

Disposable coveralls are available with attached foot and head coverings. Coveralls should be available in large and extra large sizes to allow for wearer comfort and full range of motion. If the coveralls are too large, they can be made to fit smaller employees by duct taping the ankles, wrists, and waist.

Protective clothing should be put on in the clean room, or a room that has been designated as the "clean area" or "change room". This should be adjacent to the work area, or as close as possible to the work area. A clean room can be constructed just outside the work area using 6 ml. plastic sheeting fashioned similarly to a decontamination chamber. Put on protecting clothing in the following sequence:

- Disposable coveralls
- Foot coverings (if not attached)
- Tape ankles to take up slack (be sure to fold over the end of the duct tape as a tab for easy removal)
- Put a strip of duct tape across the bottom of the foot covering to prevent slipping
- Put on gloves
- Tape sleeves over gloves (be sure to fold over the end of the duct tape as a tab for easy removal)
- Inspect respirator, put it on, and conduct fit checks
- Put on hood covering over the respirator

When removing PPE, the following sequence should be observed:

- Brush off gross contamination before leaving the work area
- Wipe down or HEPA vacuum the outside of the coveralls to remove contamination
- Remove the coveralls, carefully rolling the suit down along the body
- Place contaminated coveralls in a plastic bag and label as asbestos waste
- If no shower is available, spray mist the hair and wash face and hands
- Wipe down the respirator with a damp cloth, and place it in plastic bag

PPE that cannot be properly decontaminated should be discarded as ACM.

PPE which will be reused should be HEPA vacuumed, wet wiped, and stored in a plastic bag, labeled for asbestos work.

The sequence of procedures for entering and exiting the work area have been modified from the three-chamber decontamination process which would be followed during asbestos abatement work. Whenever possible, the full decontamination process should be followed. However, in small scale asbestos work, this is not always possible, and/or may be cost prohibitive.

5.2 Respiratory Protection

Any employee who works in an environment where fiber levels are at the permissible exposure limit or higher or who wears a negative-pressure respirator as part of his or her job must participate in a respiratory protection program. The only way to determine whether these fiber levels exist is to collect air samples during projects that disturb ACBM. In an O&M program, the use of negative-pressure respirators will make it necessary for most custodial and maintenance workers to participate in both the medical surveillance program and the respiratory protection program. Even if fiber levels are below the permissible exposure limit described above, it is strongly suggested that a building owner establish these programs and require that employees wear respirators any time they are likely to disturb ACBM.

A half face negative pressure respirator is normally worn during asbestos associated project work. However, if a doctor has determined that an employee cannot wear a negative pressure respirator, a positive pressure respirator must be provided by the employer. A half face respirator cannot be worn when facial hair interferes with a tight fit of the face to facepiece seal. A loose fitting hood or a full face respirator must be worn when a tight fit cannot be achieved with a half face respirator.

Prior to assigning a respirator to an employee, the employer must train the employee on the proper use and care of the respirator. No employee can wear a respirator without medical clearance. Under the Massachusetts regulation 453 CMR 6.00, all public sector employees are required to comply with the OSHA Respirator Standard including the medical monitoring and questionnaires.

5.3 Types of Respirators

The main categories of respirators are:

- Air Purifying respirators
- Supplied air respirators
- Self contained breathing apparatus (SCBA)

5.3.1 Air Purifying Respirators

These respirators remove contaminants from the air before it is inhaled through filters or cartridges. There are several types of air purifying respirators:

Negative pressure respirators include half-face and full-face respirators which rely on the breathing action of the wearer to draw air through the respirator filter or cartridge where it is decontaminated. HEPA filters, now called P100 filters, are designed to remove particulates, such as asbestos, from the air. These filters are magenta or purple in color. Other filters and cartridges are color coded depending upon the contaminant (gas/vapor) that each is capable of removing.

The half-face respirator covers only the part of the face from the bridge of the nose to under the chin. It requires two filter cartridges. This type of respirator cannot be used when a tight face to facepiece seal cannot be achieved. Factors that interfere with this seal include facial hair, dental work, facial scars, and eyeglasses.

The full face respirator covers the entire face from the forehead to under the chin. This respirator offers a higher protection factor, and can accommodate some forms of glasses. Various types of full face respirators may require either one or two filter cartridges.

Dust masks are not effective protection during asbestos work, and should never be worn during any asbestos associated projects.

Powered air purifying respirators (PAPRs) are positive pressure respirators which use a portable rechargeable battery pack and blower motor to force the contaminated air through a filter or cartridge, and into the wearer's breathing zone. PAPRs are available with a tight fitting full facepiece and loose fitting helmet or hood. PAPRs must be made available to employees who cannot wear negative pressure respirators.

Air purifying respirators can only be used in situations where the fiber concentration is known. The limits of these respirators are listed in the chart at the end of this section, based upon the protection factor (PF).

Air purifying respirators can **never** be used in an oxygen deficient atmosphere or where the type and/or concentration of contaminants is unknown.

5.3.2 Supplied Air Respirators

These respirators supply fresh air from a source outside the contaminated area. Air is delivered to the facepiece through a hose. Depending on how the airflow is regulated, these respirators can be classified as:

Constant or Continuous Flow – air is being continuously supplied to the facepiece.

Demand delivers air to the wearer only during inhalation. It is essentially a negative pressure respirator, since the wearer must first create a negative pressure zone inside the facepiece before the regulator supplies air.

Pressure Demand maintains a positive pressure inside the facepiece at all times.

5.3.3 Self Contained Breathing Apparatus (SCBA)

These respirators permits the wearer the highest degree of protection, and are the only respirators which can be used in IDLH (immediately dangerous to life and health) atmospheres, such as oxygen deficient, unknown contaminants and/or concentrations. The wearer carries a cylinder of compressed air on the back. A significant drawback to this respirator is the limited amount of breathing time, usually 30 to 60 minutes. Prior to using this respirator, the wearer must be fully aware of the end of service indicators which signal that there are just a few minutes of breathing air left, and the user must exit the work area. Breathing through the regulator differs greatly from a negative or positive pressure respirator, and requires practice. This respirator is not practical for asbestos abatement work.

All respirators must be approved by NIOSH.

5.4 Selecting a Respirator

Respiratory hazards which are generally encountered are:

☐ Oxygen Deficient ☐ Toxic Contaminants

Oxygen deficient atmospheres are typically not a hazard during asbestos associated project work, unless the work is being conducted in steam tunnels, boilers, crawl spaces, or other types of confined spaces.

Toxic contaminants can be classified as:

☐ particulates ☐ gases and vapors ☐ any combination of particulates, gases, and vapors

Asbestos is considered a particulate, carbon monoxide would be a toxic gas, and solvents would be considered toxic vapors. Cartridges are color coded to identify which type of hazard for which they will provide protection. *Always be sure the cartridge is appropriate for the contaminant.*

Once the hazards have been determined, efforts should be made to reduce and/or eliminate them. Even after these two steps have been completed, respirators are often needed for protection. Respirators are selected based on the anticipated hazard, the exposure level in the work area, and the type of work activity. The choice of facepiece depends on the level of protection needed—that is the assigned protection faction (APF) needed.

NIOSH assigns each type of respirator a protection factor, which indicates the maximum fiber concentration in which each respirator can be used. A protection factor is determined by using a simple formula which compares the concentration outside the mask to the concentration inside the mask.

$$\textbf{Protection Factor (PF)} = \frac{\textbf{Concentration Outside Mask}}{\textbf{Concentration Inside Mask}}$$

The concentration inside the mask will vary with the fit of the mask to the worker's face. Facial hair, facial scars, dental work, glasses, chewing gum and laughing or coughing will affect the fit.

A level of .01 fibers per cubic centimeter is considered to be the maximum acceptable concentration inside the mask. Based on this level, the following chart indicates the appropriate respirator under various fiber concentrations.

Filters

High efficiency particulate air (HEPA) filters are used with non-powered, air-purifying, particulate filter respirators, and typically are purple or magenta in color. NIOSH has provided nine classes of filters based on their efficiency—95%, 99%, 99.97%. Within each of these efficiency ratings, the filter is then classified as:

N – **N**ot resistant to oil
R – **R**esistance to oil
P – oil **P**roof

The N-R-P series of filters depends on the presence or absence of oil particles.

The selection of filter efficiency (95%, 99%, 99.97%) depends on how much filter leakage can be accepted. HEPA filters mean very little filter leakage.

5.5 Fit Testing

The most important element of a respirator is the proper fit. An initial fit test is performed when a respirator is issued to an employee. This means the wearer must undergo a test to ensure that the fit of the respirator is tight. Fit tests must be conducted every six months thereafter. There are two methods of fit testing:

Qualitative – pass or fail
Quantitative – measuring contaminant inside the mask vs. outside the mask

Qualitative fit testing is the most commonly employed method, and there are several different and acceptable protocols which can be used: (1) irritant fume (2) bitrex (3) banana oil (4) saccharine

Some individuals may be sensitized to a particular substance, so there is no particular protocol which should be employed unilaterally. OSHA fit test procedures at the end of this section give the specific protocol procedures for all acceptable fit test methods.

Quantitative fit testing requires a test substance which can be generated into the air, specialized equipment to measure the airborne concentration of the substance, and a trained tester. The person to be tested puts on a respirator and enters a chamber filled with air containing the test substance. The airborne concentration of the substance is measured both outside the respirator and inside the respirator, through a probe, while the wearer performs several exercises. The specific degree of protection, or fit factor, can be determined for the wearer with the specific respirator worn. A general overview of quantitative fit test protocols is discussed at the end of the OSHA fit test procedures.

Results of fit testing are recorded on a form, similar to the sample at the end of this section. A fit test record must be kept for each employee as part of the Respirator Program.

Fit Checks

Each time the wearer puts on a respirator, a **positive** and **negative** fit must be done to ensure that the fit is tight.

The OSHA reference sheet for conducting fit checks is included in this section.

5.6 Medial Monitoring

The OSHA Asbestos Standard for the Construction Industry and the EPA Worker Protection Rule explain when employees are required to wear a negative-pressure respirator and must be involved in a medical surveillance program (see also OSHA Asbestos Standard for General Industry). The purpose of a medical surveillance program is to determine whether or not an employee is healthy enough to wear a respirator and to detect any health changes in an employee's body resulting from working in asbestos-contaminated areas. Changes in health may indicate the onset of an asbestos-related disease.

The employer shall provide or make available at his cost, medical examinations to workers exposed to asbestos *(A) initially within 30 days of employment, (B) annually and (C) within 30 days of employment termination*. Medical records must be maintained for 30 years beyond termination of employment. Examinations must include:

- -- a medical and work history;
- -- a physical exam with special emphasis directed to the respiratory, cardiovascular and gastrointestinal systems;
- -- completion of a respiratory disease questionnaire
- -- a pulmonary function test

The initial medical questionnaire includes a complete medical and work history. The annual exam requires the completion of an abbreviated medical questionnaire. Both are included at the end of this section. A chest x-ray may or may not be given.

The pulmonary function test measures lung capacity. The FVC (forced vital capacity) is the maximum amount of air than can be expelled from the lungs after full inhalation. The $FEV_{1.0}$ (forced expiratory volume at one second) is the amount of air forcibly expelled in one second after full inhalation.

The physician must inform the employee of the increased risk of lung cancer due to the combined effects of smoking and working with asbestos, and the results of the medical examination.

The physician is not to provide to the employer any findings or diagnosis unrelated to the occupational exposure to asbestos. The employer must also be provided with the physician's statement indicating whether or not the employee is capable of wearing a respirator.

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OSHA Regulations (Standards - 29 CFR)

User Seal Check Procedures (Mandatory). - 1910.134 App B-1

◀ OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.134 App B-1
- **Standard Title:** User Seal Check Procedures (Mandatory).
- **SubPart Number:** I
- **SubPart Title:** Personal Protective Equipment
- **Applicable Standard:** Applicable Standard:

Appendix B-1 to § 1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. *Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

[63 FR 1152, Jan. 8, 1998]

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OSHA Regulations (Standards - 29 CFR)

Fit Testing Procedures (Mandatory). - 1910.134 App A

◀ OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.134 App A
- **Standard Title:** Fit Testing Procedures (Mandatory).
- **SubPart Number:** I
- **SubPart Title:** Personal Protective Equipment
- **Applicable Standard:** Applicable Standard:

Interpretation(s)

Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

    (a) Position of the mask on the nose

(b) Room for eye protection

(c) Room to talk

(d) Position of mask on face and cheeks

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

(a) Chin properly placed;

(b) Adequate strap tension, not overly tightened;

(c) Fit across nose bridge;

(d) Respirator of proper size to span distance from nose to chin;

(e) Tendency of respirator to slip;

(f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. Test Exercises. (a) The following test exercises are to be performed for all fit

testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist. (8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of

this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize

before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it

is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex^{TM} (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex^{TM} (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of

the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

5. Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

(a) General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test

or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second

sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and

expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM

ARGEO PAUL CELLUCCI
GOVERNOR

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LIEUTENANT GOVERNOR

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DEPUTY DIRECTOR

MEDICAL EVALUATION FOR EMPLOYEES ISSUED RESPIRATORS

A new OSHA standard on respiratory protection (29 CFR 1910.134) is now in effect. This standard mandates certain provisions, including the requirement for medical evaluation for employees who are issued respirators by their employers. The standard specifically states that it is only providing the minimum requirements.

Although public sector workplaces in Massachusetts are not covered by OSHA standards, it is the policy of the Division of Occupational Safety that public sector employers comply with the same requirements.

When is a medical evaluation required?

A medical evaluation is required before an individual is fit tested or required to use a respirator. This is regardless of the type of respirator to be used (e.g., disposable, half face, full face, etc.). Even if respirator use is optional, a medical evaluation is still required. The only exception to this is the voluntary use of dust masks.

Why is a medical evaluation required?

Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used and the health conditions of the employee. Some of the health conditions can include high blood pressure, diseases affecting the lungs and certain heart conditions.

What is the medical evaluation?

The medical evaluation is either:

- a medical questionnaire, or

a medical exam that provides the same information as the medical questionnaire.

The medical questionnaire consists of specific questions as defined in the standard. Mandatory questions ask about type of respirator to be used; medical conditions; lung conditions; heart conditions; and medications being taken. Additional questions are required for persons using either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). The health care provider who reviews the questionnaire will determine whether any further questions are warranted or whether a follow-up medical exam is necessary. The medical exam may include tests of lung function (called either spirometry or pulmonary function testing) and/or a chest x-ray.

Under what circumstances are additional medical evaluations required?

The employer shall provide additional medical evaluations that comply with the requirements of 1910.134 if:

- an employee reports medical signs or symptoms related to the ability to use a respirator;
- it is reported to the employer by a health care professional, supervisor, or the respirator program administrator that an employee needs to be reevaluated;
- information from the respiratory protection program indicates a need for employee reevaluation; or
- a change occurs in workplace conditions that may result in a substantial increase in the physiological burden placed on an employee (e.g., an increase in temperature of the workplace, increased workload, or a change in the type of respirator used).

Who performs the medical evaluation?

The medical evaluation is done by a physician or other licensed health care professional (hereafter referred to as health care professional). This refers to an individual whose legally permitted scope of practice allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services required.

How often should the medical evaluation be done?

The OSHA standard does not specify how frequently the evaluation must be done. However, according to the American Thoracic Society, there are guidelines which have been published by different groups. For younger workers with no significant medical problems, reevaluation every two years may be adequate. For older workers or workers using SCBAs, reevaluation on an annual basis may be more appropriate. The health care professional performing the medical evaluation will determine the frequency.

What rights do employees have?

The questionnaire and/or exams shall be given free of charge to employees. They also shall be administered confidentially during the employee's normal working hours or at a time or place convenient to the employee. The employee must be able to understand the content of the questionnaire and must be given the opportunity to discuss the questionnaire and examination with the health care professional.

What information must the employer report to the health care professional?

The employer must provide the following information to the health care professional before the recommendation is made regarding an employee's ability to use a respirator:

- the type and weight of the respirator to be used by the employee;
- the duration and frequency of use;
- the expected physical work effort;
- additional protective clothing and equipment;
- temperature and humidity extremes that may be encountered;
- the company's written respiratory protection program and a copy of the respiratory protection standard (29 CFR 1910.134).

What responsibilities does the health care professional have?

The health care professional has to provide the employer with a written recommendation regarding the employee's ability to use the respirator. The opinion must not include any confidential medical information and must be limited to the following:

- any limitations on using a respirator;
- the need for any follow-up medical evaluations.

The health care professional must also provide a copy of his/her written recommendations to the employee.

What obligations does the employer have to the employee?

The employer must provide a powered air purifying respirator (PAPR) to the employee if the health care professional determines that the employee cannot medically use a negative pressure respirator (which is non-powered) but is able to use a PAPR. A PAPR is a respirator which has a battery powered blower to move air through filters, thus reducing strain on the respirator user.

How long must records be kept?

Medical evaluation records must be retained for at least the duration of employment plus thirty years. These records also must be made available to the employee or to his or her designated representative. For further details, refer to the Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

REFERENCES

OSHA, 1/8/1998. 29 CFR 1910.134, Respiratory Protection. Federal Register, 1270.

OSHA, 6/20/1996. 29 CFR 1910.1020, Access to Employee Exposure and Medical Records. Federal Register, 31430.

American Thoracic Society, 1996, Respiratory protection guidelines. American Journal of Respiratory and Critical Care Medicine, Vol. 154, pp. 1153-1165.

Request for Medical Clearance for Respirator Use Questionnaire

Employee	Social Security Number	Date of Birth
Supervisor		Department

Circle Type or Types of Respirator(s) to be Used:

Atmosphere-supplying respirator	Continuous-flow respirator
Open-circuit SCBA	Closed circuit SCBA
Supplied-air respirator	Combination air-line and SCBA
Air-purifying (nonpowered)	Air-purifying (powered)

Level of Work Effort (Circle one):

Light Moderate Heavy Strenuous

Extent of Usage:

1. On a daily basis
2. Occasionally — but more than once a week
3. Rarely — or for emergency situations only

Length of Time of Anticipated Effort in Hours: ____________________

Special Work Considerations (i.e., high places, temperature, hazardous material, protective clothing, etc.) ____________________

____

____

____

____
Safety Representative

- -

PHYSICIAN'S EVALUATION ____________________
Employee

CLASS: 1. No restrictions on respirator use
(Circle) 2. Some specific use restrictions
3. No respirator use permitted

Restrictions: ____________________

____

____

____
Examining Physician

Figure B2
Example of the Request for Medical Clearance for Respirator Use Questionnaire

Appendix D to Sec. 1926.1101—Medical Questionnaires (Mandatory)
This mandatory appendix contains the medical questionnaires that must be administered to all employees who are exposed to asbestos above the permissible exposure limit, and who will therefore be included in their employer's medical surveillance program.

Part 1
INITIAL MEDICAL QUESTIONNAIRE

1. NAME ____________________
2. SOCIAL SECURITY NUMBER # ____________________
3. CLOCK NUMBER ____________________
4. PRESENT OCCUPATION ____________________
5. PLANT ____________________
6. ADDRESS ____________________
7. ____________________
(Zip Code)
8. TELEPHONE NUMBER ____________________
9. INTERVIEWER ____________________
10. DATE ____________________

11. Date of Birth ____________________
Month Day Year

12. Place of Birth ____________________

13. Sex
1. Male ___
2. Female ___

14. What is your marital status? 1. Single ___ 2. Married ___
3. Widowed ___ 4. Separated/Divorced ___

15. Race
1. White ___ 4. Hispanic ___
2. Black ___ 5. Indian ___
3. Asian ___ 6. Other ___

16. What is the highest grade completed in school? __________
(For example 12 years is completion of high school)

OCCUPATIONAL HISTORY

17A. Have you ever worked full time (30 hours per week or more) for 6 months or more? 1. Yes ___ 2. No ___

IF YES TO 17A:

B. Have you ever worked for a year or more in any dusty job? 1. Yes ___ 2. No ___ 3. Does Not Apply ___

Specify job/industry ______________ Total Years Worked _____

Was dust exposure: 1. Mild ____ 2. Moderate ____ 3. Severe ____

C. Have you ever been exposed to gas or chemical fumes in your work? 1. Yes ___ 2. No ___
Specify job/industry ______________ Total Years Worked ___

Was exposure: 1. Mild ____ 2. Moderate ____ 3. Severe ____

D. What has been your usual occupation or job – the one you have worked at the longest?

1. Job occupation ____________________

2. Number of years employed in this occupation __________

3. Position/job title ____________________

4. Business, field or industry ____________________
(Record on lines the years in which you have worked in any of these industries, e.g. 1960-1969)

Have you ever worked:	YES	NO
E. In a mine? ________	____	____
F. In a quarry? ________	____	____
G. In a foundry? ________	____	____
H. In a pottery? ________	____	____
I. In a cotton, flax or hemp mill? __	____	____
J. With asbestos? ________	____	____

18. PAST MEDICAL HISTORY	YES	NO
A. Do you consider yourself to be in good health?	____	____

If "NO" state reason ____________________

B. Have you any defect of vision? ________	____	____

If "YES" state nature of defect ____________________

C. Have you any hearing defect? ________	____	____

If "YES" state nature of defect ____________________

D. Are you suffering from or have you ever suffered from:

	YES	NO
a. Epilepsy (or fits, seizures, convulsions)?	____	____
b. Rheumatic fever?	____	____
c. Kidney disease?	____	____
d. Bladder disease?	____	____
e. Diabetes?	____	____
f. Jaundice?	____	____

19. CHEST COLDS AND CHEST ILLNESSES

19A. If you get a cold, does it "usually" go to your chest? (Usually means more than 1/2 the time)
1. Yes ___ 2. No ___ 3. Don't get colds ___

20A. During the past 3 years, have you had any chest illnesses that have kept you off work, indoors at home, or in bed?
1. Yes ___ 2. No ___
IF YES TO 20A:
B. Did you produce phlegm with any of these chest illnesses?
1. Yes ___ 2. No ___ 3. Does Not Apply ___

C. In the last 3 years, how many such illnesses with (increased) phlegm did you have which lasted a week or more?
Number of illnesses ___ No such illnesses ___

21. Did you have any lung trouble before the age of 16?
1. Yes ___ 2. No ___

22. Have you ever had any of the following?

1A. Attacks of bronchitis? 1. Yes ___ 2. No ___

IF YES TO 1A:
B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. At what age was your first attack? Age in Years ___
Does Not Apply ___

2A. Pneumonia (include bronchopneumonia)? 1. Yes ___ 2. No ___

IF YES TO 2A:
B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. At what age did you first have it? Age in Years ___
Does Not Apply ___

3A. Hay Fever? 1. Yes ___ 2. No ___
IF YES TO 3A:
B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. At what age did it start? Age in Years ___
Does Not Apply ___

23A. Have you ever had chronic bronchitis? 1. Yes ___ 2. No ___
IF YES TO 23A:
B. Do you still have it? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

D. At what age did it start? Age in Years ___
Does Not Apply ___

24A. Have you ever had emphysema? 1. Yes ___ 2. No ___
IF YES TO 24A:
B. Do you still have it? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

D. At what age did it start? Age in Years ___
Does Not Apply ___

25A. Have you ever had asthma? 1. Yes ___ 2. No ___
IF YES TO 25A:
B. Do you still have it? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

D. At what age did it start? Age in Years ___
Does Not Apply ___
E. If you no longer have it, at what age did it stop?
Age stopped ___
Does Not Apply ___

26. Have you ever had:

A. Any other chest illness? 1. Yes ___ 2. No ___

If yes, please specify ___________________________

B. Any chest operations? 1. Yes ___ 2. No ___

If yes, please specify ___________________________

C. Any chest injuries? 1. Yes ___ 2. No ___

If yes, please specify ___________________________

27A. Has a doctor ever told you that you had heart trouble?
1. Yes ___ 2. No ___

IF YES TO 27A:
B. Have you ever had treatment for heart trouble in the past 10 years?
1. Yes ___ 2. No ___
3. Does Not Apply ___

28A. Has a doctor told you that you had high blood pressure?
1. Yes ___ 2. No ___

IF YES TO 28A:
B. Have you had any treatment for high blood pressure (hypertension) in the past 10 years? 1. Yes ___ 2. No ___
3. Does Not Apply ___

29. When did you last have your chest X-rayed?
(Year) ___ ___ ___ ___

30. Where did you last have your chest X-rayed (if known)?

____

What was the outcome? ___________________________

FAMILY HISTORY

31. Were either of your natural parents ever told by a doctor that they had a chronic lung condition such as:

	FATHER			MOTHER		
	1. Yes	2. No	3. Don't know	1. Yes	2. No	3. Don't know
A. Chronic Bronchitis?	___	___	___	___	___	___
B. Emphysema?	___	___	___	___	___	___
C. Asthma?	___	___	___	___	___	___
D. Lung cancer?	___	___	___	___	___	___
E. Other chest conditions?	___	___	___	___	___	___
F. Is parent currently alive?	___	___	___	___	___	___

G. Please Specify ___ Age if Living ___ Age if Living
___ Age at Death ___ Age at Death
___ Don't Know ___ Don't Know

H. Please specify cause of death

___________________________ ___________________________

COUGH

32A. Do you usually have a cough? (Count a cough with first smoke or on first going out of doors. Exclude clearing of throat.)
(If no, skip to question 32C.) 1. Yes ___ 2. No ___

B. Do you usually cough as much as 4 to 6 times a day 4 or more days out of the week? 1. Yes ___ 2. No ___

C. Do you usually cough at all on getting up or first thing in the morning? 1. Yes ___ 2. No ___

D. Do you usually cough at all during the rest of the day or at night? 1. Yes ___ 2. No ___

IF YES TO ANY OF ABOVE (32A, B, C, OR D.), ANSWER THE FOLLOWING. IF NO TO ALL, CHECK "DOES NOT APPLY" AND SKIP TO NEXT PAGE

E. Do you usually cough like this on most days for 3 consecutive months or more during the year?
1. Yes ___ 2. No ___
3. Does not apply ___

F. For how many years have you had the cough? Number of years ___
Does not apply ___

33A. Do you usually bring up phlegm from your chest?
(Count phlegm with the first smoke or on first going out of doors. Exclude phlegm from the nose. Count swallowed phlegm.) (If no, skip to 33C)
1. Yes ___ 2. No ___

B. Do you usually bring up phlegm like this as much as twice a day 4 or more days out of the week?
1. Yes ___ 2. No ___

C. Do you usually bring up phlegm at all on getting up or first thing in the morning?
1. Yes ___ 2. No ___

D. Do you usually bring up phlegm at all on during the rest of the day or at night?
1. Yes ___ 2. No ___

IF YES TO ANY OF THE ABOVE (33A, B, C, OR D), ANSWER THE FOLLOWING:

IF NO TO ALL, CHECK "DOES NOT APPLY" AND SKIP TO 34A

E. Do you bring up phlegm like this on most days for 3 consecutive months or more during the year?
1. Yes ___ 2. No ___
3. Does not apply ___

F. For how many years have you had trouble with phlegm?
Number of years ___
Does not apply ___

EPISODES OF COUGH AND PHLEGM

34A. Have you had periods or episodes of (increased*) cough and phlegm
lasting for 3 weeks or more each year?
*(For persons who usually have cough and/or phlegm)
1. Yes ___ 2. No ___

IF YES TO 34A
B. For how long have you had at least 1 such episode per year?
Number of years ___
Does not apply ___

WHEEZING
35A. Does your chest ever sound wheezy or whistling
1. When you have a cold? 1. Yes ___ 2. No ___

2. Occasionally apart from colds? 1. Yes ___ 2. No ___

3. Most days or nights? 1. Yes ___ 2. No ___

IF YES TO 1, 2, or 3 in 35A
B. For how many years has this been present?
Number of years ___
Does not apply ___

36A. Have you ever had an attack of wheezing that has made you feel short of breath?
1. Yes ___ 2. No ___
IF YES TO 36A
B. How old were you when you had your first such attack?
Age in years ___
Does not apply ___

C. Have you had 2 or more such episodes?
1. Yes ___ 2. No ___
3. Does not apply ___

D. Have you ever required medicine or treatment for the(se) attack(s)?
1. Yes ___ 2. No ___
3. Does not apply ___

BREATHLESSNESS
37. If disabled from walking by any condition other than heart or lung disease, please describe and proceed to question 39A.

Nature of condition(s)

____

____

38A. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill? 1. Yes ___ 2. No ___
IF YES TO 38A

B. Do you have to walk slower than people of your age on the level because of breathlessness? 1. Yes ___ 2. No ___
3. Does not apply ___

C. Do you ever have to stop for breath when walking at your own pace on the level? 1. Yes ___ 2. No ___
3. Does not apply ___

D. Do you ever have to stop for breath after walking about 100 yards (or after a few minutes) on the level? 1. Yes ___ 2. No ___
3. Does not apply ___

E. Are you too breathless to leave the house or breathless on dressing or climbing one flight of stairs?
1. Yes ___ 2. No ___
3. Does not apply ___

TOBACCO SMOKING

39A. Have you ever smoked cigarettes? (No means less than 20 packs of
cigarettes or 12 oz. of tobacco in a lifetime or less than 1 cigarette a day for 1 year.) 1. Yes ___ 2. No ___
IF YES TO 39A

B. Do you now smoke cigarettes (as of one month ago)
1. Yes ___ 2. No ___
3. Does not apply ___

C. How old were you when you first started regular cigarette smoking?
Age in years ___
Does not apply ___

D. If you have stopped smoking cigarettes completely, how old were you when you stopped? Age stopped ___
Check if still smoking ___
Does not apply ___

E. How many cigarettes do you smoke per day now?
Cigarettes per day ___
Does not apply ___

F. On the average of the entire time you smoked, how many cigarettes did you smoke per day? Cigarettes per day ___
Does not apply ___

G. Do or did you inhale the cigarette smoke?
1. Does not apply ___
2. Not at all ___
3. Slightly ___
4. Moderately ___
5. Deeply ___

40A. Have you ever smoked a pipe regularly?
(Yes means more than 12 oz. of tobacco in a lifetime.)
1. Yes ___ 2. No ___

IF YES TO 40A:

FOR PERSONS WHO HAVE EVER SMOKED A PIPE

B. 1. How old were you when you started to smoke a pipe regularly?
Age ___

2. If you have stopped smoking a pipe completely, how old were you when you stopped?
Age stopped ___
Check if still smoking pipe ___
Does not apply ___

C. On the average over the entire time you smoked a pipe, how much pipe tobacco did you smoke per week?
(a standard pouch of tobacco contains 1 1/2 oz.) ___ oz. per week
___ Does not apply

D. How much pipe tobacco are you smoking now?
oz. per week ___
Not currently smoking a pipe ___

E. Do you or did you inhale the pipe smoke?
1. Never smoked ___
2. Not at all ___
3. Slightly ___
4. Moderately ___
5. Deeply ___

41A. Have you ever smoked cigars regularly? 1. Yes ___ 2. No ___
(Yes means more than 1 cigar a week for a year)

IF YES TO 41A

FOR PERSONS WHO HAVE EVER SMOKED A CIGAR

B. 1. How old were you when you started smoking cigars regularly? Age ___

2. If you have stopped smoking cigars completely, how old were you when you stopped?
Age stopped ___
Check if still smoking cigars ___
Does not apply ___

C. On the average over the entire time you smoked cigars, how many cigars did you smoke per week?
Cigars per week ___
Does not apply ___

D. How many cigars are you smoking per week now?
Cigars per week ___
Check if not smoking cigars currently ___

E. Do or did you inhale the cigar smoke?
1. Never smoked ___
2. Not at all ___
3. Slightly ___
4. Moderately ___
5. Deeply ___

Signature ______________________ Date ____________

Part 2
PERIODIC MEDICAL QUESTIONNAIRE

1. NAME ______________________________

2. SOCIAL SECURITY # __ __ __ __ __ __ __ __ __

3. CLOCK NUMBER __ __ __ __ __ __ __ __

4. PRESENT OCCUPATION ______________________

5. PLANT ______________________________

6. ADDRESS ____________________________

7. ______________________________
(Zip Code)

8. TELEPHONE NUMBER ______________________

9. INTERVIEWER ________________________

10. DATE ____________ __ __ __ __ __ __

11. What is your marital status? 1. Single ___ 4. Separated/.
2. Married ___ Divorced ___
3. Widowed ___

12. OCCUPATIONAL HISTORY.

12A. In the past year, did you work full time (30 hours per week or more) for 6 months or more? 1. Yes ___ 2. No ___

IF YES TO 12A:

12B. In the past year, did you work in a dusty job? 1. Yes ___ 2. No ___ 3. Does not Apply ___

12C. Was dust exposure: 1. Mild ___ 2. Moderate ___ 3. Severe ___

12D. In the past year, were you exposed to gas or chemical fumes in your work? 1. Yes ___ 2. No ___

12E. Was exposure: 1. Mild ___ 2. Moderate ___ 3. Severe ___

12F. In the past year, what was your:
1. Job/occupation? ____________________
2. Position/job title? ____________________

13. RECENT MEDICAL HISTORY

13A. Do you consider yourself to be in good health? Yes ___ No ___

IF NO, state reason ______________________________

13B. In the past year, have you developed:

	Yes	No
Epilepsy?	___	___
Rheumatic fever?	___	___
Kidney disease?	___	___
Bladder disease?	___	___
Diabetes?	___	___
Jaundice?	___	___
Cancer?	___	___

14. CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it "usually" go to your chest? (usually means more than 1/2 the time)
1. Yes ___ 2. No ___
3. Don't get colds ___

15A. During the past year, have you had any chest illnesses that have kept you off work, indoors at home, or in bed?
1. Yes ___ 2. No ___
3. Does Not Apply ___

IF YES TO 15A:

15B. Did you produce phlegm with any of these chest illnesses? 1. Yes ___ 2. No ___ 3. Does Not Apply ___

15C. In the past year, how many such illnesses with (increased) phlegm did you have which lasted a week or more? Number of illnesses ___ No such illnesses ___

16. RESPIRATORY SYSTEM

In the past year have you had:

	Yes or No	Further Comment on Positive Answers
Asthma	___	
Bronchitis	___	
Hay Fever	___	
Other Allergies	___	

	Yes or No	Further Comment on Positive Answers
Pneumonia	___	
Tuberculosis	___	
Chest Surgery	___	
Other Lung Problems	___	
Heart Disease	___	

Do you have:

	Yes or No	Further Comment on Positive Answers
Frequent colds	___	
Chronic cough	___	
Shortness of breath when walking or climbing one flight or stairs	___	

Do you:

Wheeze ___

Cough up phlegm ___

Smoke cigarettes ___ Packs per day ___ How many years ___

Date ________ Signature ______________________________

RECOMMENDED RESPIRATOR SELECTION FOR PROTECTION AGAINST ASBESTOS

RESPIRATOR	OSHA PF(1)	NIOSH PF(2)	ANSI PF(3)	MAXIMUM USE CONCENTRATION(4)
Half-Mask Air Purifying w/HEPA Filters	10	10	10	0.1 f/cc
Full Facepiece Air-Purifying w/HEPA Filters	50/10(5)	50	100/10(5)	0.5 f/cc
Powered Air-Purifying (PAPR), Loose-Fitting Helmet or Hood with HEPA Filters	100	25	1000/25(6)	0.25 f/cc
Powered Air-Purifying (PAPR), Full Facepiece w/HEPA Filters	100	50	1000	0.5 f/cc
Supplied Air, Continuous Flow, Loose-Fitting Helmet or Hood	100	25	1000/25(6)	0.25 f/cc
Supplied Air, Continuous Flow, Full Facepiece + HEPA Filters	100	50	1000	0.5 f/cc
Full Facepiece Supplied Air, Pressure Demand + HEPA Filters (Escape)	1,000	2,000	1000	10 f/cc
Full Facepiece Supplied Air, Pressure Demand w/Auxiliary SCBA, Pressure Demand or Continuous Flow	>1,000	10,000	Not Assigned	>10 f/cc

Notes:

1. Table 1, OSHA Asbestos Standard for Construction Industry (29 CFR 1926.1101).
2. NIOSH Respirator Decision Logic, May 1987 (Publication No. 87-198)
3. ANSI Respirator Standard, Z88.2-1992.
4. The maximum use concentration values represent the maximum fiber levels allowed outside the respirator that will maintain exposure inside the respirator at or below 0.01 f/cc. Each was calculated using the more conservative of PF values published by OSHA and NIOSH, assuming a target concentration of 0.01 f/cc inside the mask. (MUC = PF x 0.01 f/cc)
5. PF = 10 if Qualitative Fit Testing performed; PF = 50 (OSHA) or 100 (ANSI) if Quantitative Fit Testing performed
6. PAPR must cover neck to be assigned PF = 1000; otherwise PF = 25.

RESPIRATOR FIT TEST

Employee Name:____________________________________ Date:____________

Facility Name & Address:____

____

RESPIRATOR TESTED

Type__________________________ Brand____________ Size___ Model #_____

TEST AGENT

Isoamyl Acetate Protocol__________________

Bitrex Sensitivity Test Solution ____Pass ____Fail # of squeezes 10 20 30

_______Head stationary, breathing normally

_______Head stationary, breathing deeply and regularly

_______Turning head all the way from one side to the other side. Inhaling on each side. Do not bump the respirator against the shoulders.

_______Nodding the head up and down every second. Inhaling when the head is in the

_______Talking aloud and slowly for several minutes, Rainbow Passage:

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

______Jogging in place, or bend over

______Head stationary, breathing normally

Pass:_________ Fail:___________

Name of tester__________________________________

Revised 10/99

SECTION 6 PROPER METHODS OF HANDLING ASBESTOS

6.1 REQUIRED WORK PRACTICES AND ENGINEERING CONTROLS:

When conducting any asbestos related work, even small scale work, the following work practices are required:

- Wet methods
- HEPA vacuum
- Prompt cleanup/disposal

Wet methods include spray misting the area prior to removing or repairing ACM. Amended water, also known as a **surfactant** may be necessary to penetrate the ACM adequately. ACM must remain wet throughout the work process, and ACM must be bagged wet. Even during the glovebag procedure, each glovebag contains a slit for a spray mister to keep the ACM wet during the removal process.

HEPA vacuums are vacuums which are equipped with a special filter (High Efficiency Particulate Air filter) which is capable of filtering out particles down to .3 microns in size. These filters also prevent redistribution of particles back into the air. Any vacuuming done during decontamination and cleanup procedures must be done with a HEPA vacuum.

Prompt cleanup/disposal of wastes and debris contaminated with asbestos in sealed, leak-tight containers. At a minimum, this should be done once each work shift.

Labeling of asbestos containing materials is required by both state and federal regulations. Waste must be double bagged in 6 mil polyethylene and labeled as asbestos containing. The name of the waste generator is also required under the NESHAP regulation.

Engineering controls are intended to keep airborne fiber levels to a minimum. These control methods include:

Ventilation of the work area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter.

Local exhaust ventilation equipped with HEPA filter dust collection devices

Isolation or enclosure of the work operation generating asbestos dust

6.2 PROHIBITED WORK PRACTICES AND ENGINEERING CONTROLS:

- High speed abrasive disc saws without HEPA filter attachment and dust collection devices
- Compressed air without capture devise
- Dry sweeping/shoveling
- Employee rotation
- NO SMOKING, eating, drinking, chewing gum in work area
- Unauthorized personnel in the work area

6.3 EMERGENCY PROCEDURES

As long as ACBM remains in a building, there is a risk of a fiber release episode. Custodial and maintenance workers should be aware of this and should always report any of the following occurrences to the asbestos program manager:

1. Any debris found on the floor or other horizontal surface
2. Any water or physical damage to the ACBM
3. Any other evidence of possible fiber release

There are two types of fiber release episodes: minor episodes and major episodes. The specific procedures that must be followed depend on which type of episode occurs.

6.3.1 Minor Fiber Release Episode

A minor fiber release episode consists of the falling or dislodging of *three square or linear feet or less* of friable ACBM. Regulations require the following:

1. The debris is thoroughly saturated using wet methods
2. The area is cleaned
3. The asbestos debris is placed in a sealed, leak-tight container
4. The area of damaged ACBM is repaired with such materials as asbestos-free spackling, plaster, cement, or insulation; sealed with latex paint or an encapsulant; or an appropriate response action is implemented. When a minor fiber release episode occurs, regulation allows the designated person to assign an appropriately trained O&M in-house team to clean up the debris and make repairs as soon as possible. Note, however, that local regulations may be more stringent than the federal requirements.

6.3.2 Major Fiber Release Episode

A major fiber release episode consists of the falling or dislodging of *more than three square or linear feet* of friable ACBM. Regulation requires that when such an episode occurs, the building owner must ensure that:

1. Entry into the area is restricted and signs posted to prevent entry into the area by persons other than those necessary to perform the response action.

2. The air-handling system is shut off or temporarily modified to prevent the distribution of fibers to other areas in the building.
3. The response action for any major fiber release episode is designed by persons accredited to design response actions and conducted by persons accredited to conduct response actions. After a response action is implemented to manage a major fiber release episode, the final air clearance requirements must be met before the response action is considered complete. **Major and minor fiber-release episodes should be documented and included in the O&M plan regardless of whether the building owner uses in-house staff or an outside asbestos abatement contractor to implement an appropriate response action.** If an outside contractor is used, be sure that the contractor's crew has been properly trained or certified before signing a contract.

The building owner is ultimately responsible when a consultant or contractor is employed to handle the asbestos emergency. Documentation should indicate that these procedures were followed for the safety and health of building occupants.

Sample forms for recording relevant information regarding these episodes is included at the end of this section.

6.4 Abatement Of Non-Friable VAT

DOS has defined 2 categories of Non-Friable Asbestos Containing Material:

- *Category I* – packings, gaskets, resilient floor coverings,, asphalt roofing products containing more than 1% asbestos
- *Category II* – any other material not listed in Category I which contains more than 1% asbestos

The abatement requirements of non-friables is determined by the method of abatement, the criteria being the creation of dust. If the activity performed upon the non-friable material renders it friable or creates dust, then the abatement activity becomes subject to DLWD regulatory requirements.

If dust is generated during the work operation or the material becomes friable, then one of the following work practice requirements will apply:

A) Any work operation which involves sanding, grinding, cutting (by sawing), chipping, breaking, shearing, slicing or abrading **greater than 3 linear or square feet** of Category I or II non-friable ACM is considered an Asbestos Response Action, and is subject to the requirements of 453 CMR 6.14.

B) Any work operation which involves sanding, grinding, cutting (by sawing), chipping, breaking, shearing, slicing or abrading **3 or fewer linear or square feet** of

Category I or II non-friable ACM is considered a Small Scale Asbestos Project, and is subject to the requirements of 453 CMR 6.13(1).

C) If breaking, shearing, or slicing of non-friable materials does result in the production of asbestos dust or the material becoming friable, then 453 CMR 6.00 does not apply. However, any material removed must be disposed of in accordance with other state and federal regulations.

Methods advocated by the Resilient Floor Covering Institute incorporate safe work practices and engineering controls to reduce worker exposure and prevent the spread of contamination. Other manufacturers of floor covering suggest industry accepted methods for removal.

DOS also recommends following the OSHA established work practices for Class II work, the removal of miscellaneous materials. Specific work practices are provided for the removal of roofing material, vinyl and asphalt flooring, transite panels and gaskets. A regulatory summary of the DOS requirements for VAT removal operations are included at the end of this section.

6.5 Housekeeping

Housekeeping with respect to asbestos related activities is considered by OSHA a Class IV type of job, and requires all maintenance and custodial staff conducting these activities to have 2 hours awareness training. In schools and public buildings, the same training is required.

Work Practices

Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing consigned for disposal must be collected an disposed of in sealed, labeled, impermeable bags or other closed, labeled impermeable containers, Employees must use HEPA-filtered vacuuming equipment and must empty it so as to minimize asbestos reentry into the workplace.

All vinyl and asphalt flooring material rest remain intact unless the building owner demonstrates that the flooring does not contain asbestos. Sanding flooring material is prohibited. Employees stripping finishes must use wet methods and low abrasion pads at speeds lower than 300 revolutions per minute. Burnishing or dry buffing may be done only on flooring with enough finish that the pad cannot contact the flooring material. Additional information on the care and maintenance of asbestos floor tile is available from the Division of Occupational Safety.

Employees must not dust, sweep, or vacuum without a HEPA filter in an area containing thermal system insulation or surfacing material or visibly deteriorated asbestos-containing materials. Employees must promptly clean and dispose of dust and debris in leak-tight containers.

SUPPLIES for Maintenance/Custodial Work:

- Vacuum with a HEPA filter
- Wet mops/buckets
- Spray misters
- 6 mil poly bags for waste disposal
- Labels to identify waste as ACM (if bag is not pre-labeled)
- Duct tape to securely close waste bags

Respiratory Protection: mandatory if the fiber concentration in the area will exceed the PEL and in emergencies (when conditions are unknown)

Protective Clothing/Equipment: required for all jobs if there is no negative exposure assessment (proof that the fiber concentrations will not exceed the PEL under very similar conditions) OR if exposed to fiber concentrations above the PEL.

All housekeeping procedures and emergency procedures should be covered in the 2 hour training and documented in the asbestos management plan for the building.

Commonwealth of Massachusetts
VAT REGULATORY SUMMARY

REQUIREMENTS FOR VAT REMOVAL OPERATIONS

In the Commonwealth of Massachusetts, Vinyl Asbestos Tile (VAT) is regulated under the dual jurisdiction of the Division of Occupational Safety (DOS) and the Dept. of Environmental Protection (DEP). Both of these agencies are presently reviewing policies regarding VAT and other non-friable materials. Prior to undertaking any work with VAT, the building owner or contractor is advised to contact both these agencies to ensure compliance with applicable regulations and work practice requirements.

Work operations which involve the breaking, shearing, or slicing of Category I (including VAT) or Category II non-friable ACBM where such work *does not result in the production of asbestos dust* or the material becoming friable [453 CMR 6.13(2)(5)] are not subject to the requirements of DOS asbestos regulation 453 CMR 6.00.

If dust will be generated or the material will be made friable due to the work operation performed, then the work practices for response actions, 453 CMR 6.14 would apply. As an example, where VAT is sawed, sanded or abraided, and where the work operation renders the material friable or generates dust, the project would be considered an Asbestos Response Action, and the following requirements would apply:

1. *Notification Requirements:* DOS requires notification for projects greater than 3 linear/square feet 10 days prior to the commencement of the project must be made in writing. (453 CMR 6.12). DEP requires 10 day prior notification for any amount of removal of ACM, including VAT removal projects of all sizes.

2. *Sampling Clearance Criteria Requirements*: Clearance testing is required for all asbestos response actions, including those involving VAT removal.

    a. **Visual inspection** required to achieve *no visible debris* criteria (453 CMR 6.14(5)(a). Inspect all surfaces within the work area for dust, debris and other particulate residue.
    b. For **larger asbestos response actions conducted in schools** subject to AHERA: (453 CMR 6.14(5)(1)(a-f)
        - Greater than 160 sq.ft./260 lin.ft.
        - Aggressive sampling by TEM
        - 5 samples inside work area; 5 samples outside work area; 3 field blanks
        - Average concentration of 5 samples within the work area must be less than 70 s/mm^2
        - Laboratory analyzing samples must be certified
    c. For **smaller response actions conducted in school facilities and all size response actions in non-school facilities**: (453 CMR 6.14(5)(2)(a-f)
        - Equal to or less than 160 sq.ft/260 lin.ft.
        - Aggressive sampling by PCM or TEM
        - One sample per 500 lin.ft/1000 sq.ft. or one per room, whichever is greater

- Concentration of each sample within the work area must be equal to or less than .01 fibers/cc of air
- Laboratory analyzing samples must be certified

3. *Containment Requirements*: With few exceptions, full containment is required if work is conducted as an asbestos response action (453 CMR 6.14(4)(a)(6)(7)

4. *Negative Pressure Containment Requirements*: Required when full containment is used (453 CMR 6.14(4)(c). Exception to this requirement would be when the work involves less than or equal to 25 lin.ft or 10 sq.ft. The HEPA filtered ventilation system must maintain a reduced atmospheric pressure of at least .02 column inches of water differential within the contained work area. It must be of sufficient capacity to provide a minimum of 4 air changes per hour.

5. *Decontamination Requirements*: Three chamber decontamination facility required when full containment is used (453 CMR 6.14(4)(b). Exception to this requirement would be when the work involves less than or equal to 25 lin.ft or 10 sq.ft.

6. *Recommended abatement practice/techniques/training*: When the work is conducted as an asbestos response action:

   a. *Training*
   - minimum of 16 hours if removing less than 3 lin/sq feet of material
   - Training of 32 hours to conduct asbestos response action greater than 3 lin/sq.ft.
   - DOS also recommends the use of the following: "Recommended Work Practices for Removal of Resilient Floor Coverings", Resilient Floor Covering Institute, 966 Hungerford Drive, Suite 12B, Rockville, MD 20850; January 1998. Methods include wet removal of tile and mastic or heat sources to minimize breakage, as well as disposal in approved landfills.

   b. *Work Practices* (453 CMR 6.14(4)(a),(d),(e)
   - Wet methods, prompt clean up, double bagged, sealed and labeled.

A copy of the full requirements for an asbestos response action are attached, including the training requirements, use of licensed contractors and certified personnel and the complete list of required work practices.

7. *Disposal Requirements*: In accordance with DEP 310 CMR 7.00 and 19.00 and EPA NESHAP 40 CFR Part 61, Subpart M and other applicable state and federal standards. (453 CMR 6.14(4)(h)

8. *Regulation Guidance*: Regulatory guidance is provided in 453 CMR 6.00 by DOS and by DEP in 310 CMR 7.00, 18.00 and 19.00. Policy statements are under revision. Waivers to work practice requirements for alternative measures can be made in writing to DOS.

Updated December 1999

SECTION 7 FEDERAL AND STATE REGULATIONS

In Massachusetts, there is multiple jurisdiction among various state and federal agencies which regulate different aspects of asbestos related activities. Compliance with the requirements of one regulation does not ensure compliance with the others.

It is important to remember that one regulation does not supercede another, but rather work in conjunction to regulate asbestos activities from cradle to grave. In some instances, the state regulations will be more stringent than the federal regulations; in other instances that may not be the case.

An overview of the most relevant asbestos regulations is presented here. However, each agency issues policy statements, and periodically modifies and updates these policies based on regulatory amendments. It is prudent to contact each agency for clarification should questions or problems arise. Copies of state regulations are available from the statehouse bookstore.

7.1 AHERA [40 CFR §763, Subpart E]

In October 1986, the Asbestos Hazard Emergency Response Act (AHERA) was signed into law. Included in this Act were provisions directing the EPA to establish rules and regulations addressing asbestos-containing materials in schools. Specifically, EPA was directed to address the issues of: (1) identifying, (2) evaluating, and (3) controlling ACM in schools. The final AHERA Rule became effective December 14, 1987. They are found in 40 CFR 763 Subpart E §763.80-§763.99 under the Toxic Substance Control Act (TSCA).

The regulations require that all public and private elementary and secondary schools (K-12) inspect for both friable and non-friable asbestos, implement response actions, and submit asbestos management plans to State Governors or designated agencies. This regulation also requires that any person conducting asbestos related activities in schools be certified. The school's responsibilities to the building occupants are specifically itemized, including training requirements, recordkeeping, and notifications. Even schools with no asbestos containing materials are required to submit and maintain a management plan.

7.2 EPA WORKER PROTECTION RULE [40 CFR §763.121]

The OSHA asbestos standards ***do not cover all state and local government employees***. The EPA Worker Protection Rule (40 CFR §763.121) extends the protection afforded by the OSHA standards to all state and local government employees who are engaged in asbestos abatement and who are not otherwise covered by OSHA or an OSHA-approved state plan. Thus, when conducting

asbestos abatement activities, an employee is either covered by the OSHA asbestos standards or that employee is protected by EPA's Worker Protection Rule.

This regulation specifies when an employee is required to participate in a medical surveillance program, when personal protective equipment is needed, respirator programs and fit testing, and communication of hazards.

7.3 **NESHAP** [40 CFR §61.145-.150] (Visible Emission Standard/Demolition)

The National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations require that friable and nonfriable ACBM which is likely to become friable be removed from buildings before demolition.

The building owner must comply with the NESHAP regulations when removing asbestos materials. These regulations specify control requirements for most asbestos emissions, and include work practices to be followed to minimize the release of asbestos fibers during the handling, removal and disposal of asbestos waste materials. NESHAP regulations are frequently enforced by the State or Local Agencies. Of particular importance are the standards for the demolition and renovation of facilities (40 CFR §61.145) and for waste disposal for demolition and renovation operations (40 CFR §61.150). The standard for asbestos waste disposal for demolition and renovation operations require the building owner to: **(1)** *discharge no visible emissions* to the outside air during the collection processing, packaging, or transporting of any asbestos-containing waste material; **(2)** adequately wet the asbestos-containing waste material. As soon as possible, all asbestos-containing waste material must be taken to an asbestos waste disposal site or an EPA-approved site that converts regulated asbestos-containing material and asbestos-containing waste material into asbestos-free material as provided by law. Waste shipment records (WSRs) should be maintained by the building owner as part of the asbestos management program.

7.4 **DLWD** [453 CMR §6.00] (Asbestos Enclosure, Encapsulation & Removal)

Details the state requirements with respect to safe work practices, training and licensure, and notification for asbestos abatement activities. The Division of Occupational Safety (DOS) requires notification on asbestos abatement involving *greater than 3 linear or square feet* of ACM.

DOS also certifies and audits asbestos training providers and asbestos analytical laboratories.

7.5 **MODEL ACCREDITATION PLAN** [40 CFR §763, Appendix C, Subpart E]

EPA issued an interim final rule to revise its asbestos Model Accreditation Plan (MAP) to clarify the types of persons who must be accredited to work with asbestos in schools and public and commercial buildings and to specify the minimum number

of hours of training. This rule became effective April 1994. This regulation specifies exactly what topics must be covered in courses that are offered by approved training providers. DOS incorporates this requisite training into its regulations.

The MAP extends the AHERA training requirements to all employees conducting asbestos related activities in public and commercial buildings.

7.6 DEPT. OF ENVIRONMENTAL PROTECTION [310 C.M.R. §7.00]

This agency's asbestos regulations protect the public health by preventing the release of asbestos emissions into the ambient air. The regulation specifies notification (for renovation/demolition), handling, removal, storage and disposal requirements for any materials which contain ***one percent or greater*** asbestos by weight, both friable and non-friable. Non-friable asbestos-containing materials are included in the regulation because if these materials have deteriorated, are broken and/or mishandled, asbestos emissions may be released into the ambient air. There is no minimum amount of asbestos which is exempt from notification.

7.7 DEPT. OF TRANSPORTATION [40 CFR §171, 172]

Department of Transportation regulations require that asbestos-containing materials be labeled as Class 9 hazardous materials and establish requirements relating to the shipment of ACBM by air, rail or motor vehicles, including the type of packaging, labeling, shipping papers and placards required.

The building owner is the generator of the waste product and maintains this responsibility during transportation and disposal. Disposal of asbestos waste is also subject to each state's solid waste regulations.

7.8 HAZARD COMMUNICATION

Private sector employees are covered under the OSHA Hazard Communication Standard for the construction industry, 29 CFR 1926.59. The Hazard Communication for general industry, 29 CFR 1910.1200, has more specific requirements. Public sector employees are covered under the Right to Know program, MGL Ch. 111f.

The Mass Right to Know law requires that information be given to employees about any toxic/hazardous materials or chemicals they will be working with, how to handle them safely, potential health effects of exposure to those materials and labeling of materials that contain threshold amounts or more of a toxic or hazardous material. Asbestos had been identified as a hazardous material.

Right to Know training includes providing the following:

- Access to Material Safety Data Sheets

- Labeling on containers of chemicals
- Written instructions or training on chemical hazards and safe work procedures

All products which contain 1% or more (2% if an impurity) of one or more ingredients listed on the Mass Substance list are covered by the Right to Know Law. Asbestos is a known human carcinogen and is considered a hazardous material, and as such, is covered under Right to Know.

A DOS bulletin on Right to Know is included at the end of this section.

CLARIFICATION OF THE RIGHT TO KNOW
ASBESTOS IN BUILDING POLICY

FACT #1: IF YOU ARE AN EMPLOYEE WHO WORKS IN A BUILDING, THE RIGHT TO KNOW ASBESTOS POLICY IN BUILDINGS COVERS YOU IF:

A) YOU ARE EMPLOYED IN THE PUBLIC SECTOR AND

B) YOU ARE OR MAY BE EXPOSED IN A BUILDING TO ASBESTOS THAT MAY BE PHYSICALLY DISTURBED

FACT #2: IF YOU ARE IN THE PUBLIC SECTOR AND IF, DURING THE COURSE OF YOUR WORK, YOU MAY PHYSICALLY DISTURB ASBESTOS, YOU MUST BE TRAINED WITHIN *30 DAYS* OF THE INITIAL DATE OF HIRE AND ANNUALLY THEREAFTER ON THE HAZARDS OF ASBESTOS. FURTHER INFORMATION ON TRAINING CAN BE FOUND IN MGL CH. 111F AND 441 CMR 21.07.

FACT #3: ALTHOUGH YOU MAY WORK IN A BUILDING IN WHICH YOU SUSPECT THERE IS ASBESTOS, YOUR EMPLOYER ONLY HAS TO INFORM YOU OF THE PRESENCE OF THE ASBESTOS AND TRAIN YOU ON ITS HAZARDS UNDER THE RIGHT TO KNOW LAW IF:

A) YOU ARE IN THE PUBLIC SECTOR
B) THE ASBESTOS IS PHYSICALLY DISTURBED AND
C) YOU ARE OR MAY BE EXPOSED TO IT

THE DIVISION OF OCCUPATIONAL SAFETY STRONGLY ENCOURAGES, HOWEVER, THAT ALL EMPLOYEES BE INFORMED OF THE LOCATION OF ASBESTOS IN BUILDINGS, AND PRIOR NOTIFICATION BE GIVEN TO ANY BUILDING OCCUPANT WHOSE WORK AREA MAY BE SUBJECT TO ANY ASBESTOS REMOVAL OR REPAIR OPERATION. DOS ADVOCATES AN EFFECTIVE OPERATIONS AND MAINTENANCE PROGRAM TO PROTECT BUILDING OCCUPANTS AND EMPLOYEES FROM UNINTENTIONAL EXPOSURE TO AIRBORNE ASBESTOS FIBERS.

FACT #4: IF ASBESTOS REMOVAL OR REPAIR IS SCHEDULED IN YOUR BUILDING, THE ASBESTOS CONTRACTOR IS REQUIRED TO NOTIFY DOS, DEP AND FOR RESIDENTIAL BUILDINGS THE LOCAL BOARD OF HEALTH BEFORE WORK IS BEGUN. UNDER STATE REGULATIONS FOR THE REMOVAL, CONTAINMENT AND ENCAPSULATION OF ASBESTOS, DOS MUST BE NOTIFIED 10 DAYS PRIOR TO THE START OF ANY WORK INVOLVING GREATER THAN THREE FEET OF ASBESTOS CONTAINING MATERIAL.

FACT #5 COMPONENTS OF THE RIGHT TO KNOW LAW INCLUDE:

- LABELING
- MSDSS (MATERIAL SAFETY DATA SHEETS
- TRAINING
- WORKPLACE NOTICE
- RECORDKEEPING

THERE IS NO DESIGNATED NUMBER OF HOURS REQUIRED FOR TRAINING AS LONG AS THE MANDATED TOPICS ARE COVERED. ADDITIONAL EMPLOYEE RIGHTS CAN BE FURTHER DEFINED IN 454 CMR 21.00.

FACT #6: STRUCTURAL AND NON-STRUCTURAL ASBESTOS ARE COVERED UNDER M.G.L. CHAPTER 111F. *STRUCTURAL ASBESTOS* IS AN ASBESTOS CONTAINING MATERIAL APPLIED OR AFFIXED AS A COATING TO BEAMS, WALLS AND CEILING OF A BUILDING FOR THE PRUPOSE OF INSULATION, FIREPROOFING OR DECORATIVE COATING. *NON-STRUCTURAL ASBESTOS* IS ASBESTOS CONTAINING MATERIAL APPLIED OR AFFIXED TO PIPES, DUCTS, BOILERS, TANKS, REACTORS, FURNACES AND OTHER TYPES OF CONTAINERS. FABRICATED OR MANUFACTURED PRODUCTS IN WHICH THE ASBESTOS IS RIGIDLY INCORPORATED INTO THE PRODUCTS, SUCH AS FLOOR TILES, ASBESTOS-CEMENT BOARDS, BUILDING SIDING, ROOFING SHINGLES OR ASBESTOS TEXTILE PRODUCTS ARE EXEMPT FROM M.G.L.CH. 111F, UNLESS THE APPLICATION, MAINTENANCE AND REPAIR OF THE ARTICLE IS CONDUCTED IN A MANNER WHICH GENERATES ASBESTOS DUST.

FACT #7: BY DEFINITION, AN ASBESTOS CONTAINING MATERIAL IS ANY PRODUCT CONTAINING MORE THAN 1% ASBESTOS. ASBESTOS IS CONSIDERED A HAZARDOUS SUBSTANCE AND IS ON THE MASSACHUSETTS SUBSTANCE LIST (MSL). YOU CAN REQUEST A MATERIAL SAFETY DATA SHEET FROM YOUR EMPLOYER FOR SPECIFIC INFORMATION ON THE PHYSICAL AND CHEMICAL PROPERTIES, SAFETY PRECAUTIONS AND APPROPRIATE PROTECTIVE EQUIPMENT. THE FOLLOWING TYPES OF ASBESTOS ARE ALSO CARCINOGENS ON THE MASSACHUSETTS SUBSTANCE LIST:

ACTINOLITE ASBESTOS (CAS # 77536-66-4)
ANTHOPHYLLITE ASBESTOS (CAS # 77536-67-5)
AMOSITE ASBESTOS (CAS # 12172-73-5)
ASBESTOS (CAS # 1332-21-4)
CHRYSOTILE ASBESTOS (CAS # 12001-29-5
CROCIDOLITE ASBESTOS (CAS # 12002-28-4)
TREMOLITE ASBESTOS (CAS # 75536-68-6)

FACT #8: ALL WORKPLACES THAT STORE OR USE PRODUCTS CONTAINING COMPONENTS ON THE MSL MUST COMPLY WITH ALL THE REQUIREMENTS OF LABELING, TRAINING AND RECORDKEEPING, EXCEPT THOSE WORKPLACES THAT REQUEST AN EXEMPTION BASED ON THEIR UNIQUE STATUS AS A RESEARCH LABORATORY. THIS INCLUDES ALL STATE CONTROLLED OR STATE OPEPRATED WORKPLACES, ALTHOUGH IT DOES NOT EXTEND COVERAGE TO FEDERAL WORKPLACES. ALL STATE WORKPLACES MUST COMPLY WITH ALL ASPECTS OF THE LAW—BOTH THE WORKER AND THE COMMUNITY RIGHT TO KNOW PROVISIONS.

FACT #9: PUBLIC AND STATE FACILITIES ARE SUBJECT TO THE LABELING REQUIREMENTS OF MGL CH. 111F. ANY SUBSTANCE ON THE MSL WHICH IS FOUND IN CONCENTRATIONS GREATER THAN 1% MUST BE LABELED. THIS APPLIES TO ASBESTOS CONTAINING MATERIALS ON PIPES AND PIPING SYSTEMS, AND FIXED TANKS IN BOILER ROOMS AND ROUTINE MAINTENANCE AREAS. SIGNS OR PLACARDS SHOULD BE PLACED NEAR THE MATERIALS, AND BE READILY VISIBLE UPON ENTERING THE AREA. ADEQUATE LABELS WILL INDICATE: CAUTION. ASBESTOS. HAZARDOUS. DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT. SINCE IT MAY NOT BE PRACTICAL TO LABEL ALL ASBESTOS IN A BUILDING, TRAINING MUST INCLUDE A CLEAR DESCRIPTION AS TO THE LOCATION AND CONDITION OF THE ASBETOS. IT IS STRONGLY RECOMMENDED THAT AN ASBESTOS LOCATION MAP BE DESIGNED AND POSTED IN A CENTRAL LOCATION WITH THE RIGHT TO KNOW WORKPLACE NOTICE.

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM

GEO PAUL CELLUCCI
GOVERNOR

JANE SWIFT
LIEUTENANT GOVERNOR

ANGELO R. BUONOPANE
DIRECTOR

ROBERT J. PREZIOSO
DEPUTY DIRECTOR

Massachusetts Right to Know Law

Worker Exposure to Hazardous Materials in the Workplace

The Massachusetts Right to Know Law applies to all public sector employees working in State, county and municipal workplaces in the Commonwealth with the exception of those employed in police stations, public armories where ammunition is stored and public sector research labs (if granted an exemption by the Department of Public Health). The Massachusetts Right to Know Law became effective in 1984. Federal OSHA regulates private sector workplaces under the Hazard Communication Standard (CFR 1910.1200) with similar requirements. The Workplace portion of the Mass Right to Know law requires that information on chemical hazards be given to employees. This is accomplished by requiring that employees, who have been, are or may be exposed to toxic/hazardous chemicals in the workplace, are provided with the following:

- access to Material Safety Data Sheets (MSDSs),
- labeling on containers of chemicals, and,
- written instructions or training on chemical hazards and safe work procedures.

Chemicals Covered

All products which contain 1% or more (2% if an impurity) of one or more ingredients listed on the Mass Substance list are covered by the Right to Know Law. In order to determine this, it is necessary to get a copy of the list and request an MSDS from the manufacturer so that the ingredients can be compared to the chemicals on the list.

Alternatively, as a matter of DOS policy, it is acceptable for a municipal, county or state employer to assume that all chemicals for which a manufacturer has prepared a MSDS are covered by the Right to Know Law.

Employers have no obligations under the Right to Know Law with respect to certain items, including food, alcoholic beverages, and some consumer items, regardless of their contents. A detailed list of exempt items is set forth in the Right to Know Law (Mass General L. ch. 111F, sec. 1) and the regulations promulgated thereunder (454 CMR 21.00).

MSDSs

A material safety data sheet (MSDS) is a document, which provides important information on the ingredients and hazards of and protective equipment and practices needed to work safely with a product. The MSDS is developed by the product manufacturer. An employer who has not received an MSDS from the manufacturer must request it from the manufacturer.

An MSDS must be requested for each chemical used in the workplace in order to determine which chemicals are covered by the Law. MSDSs should be filed in an organized manner at a central location in the workplace, so that the employer can easily provide an MSDS if an employee requests one.

Labeling Requirements

Employers must label all substances subject to the RTK Law, which are in containers of more than 1 gallon or more than 5 pounds. The labels must include the chemical name of such substances. Chemical names must be used with all of the substances listed on the Mass Substance List if they are present in the container at quantities greater than 1% (2% if impurity).

Containers, which contain more than five gallons or thirty pounds of materials to which National Fire Protection Association (NFPA) Code 49 applies, must also be labeled with the proper NFPA Code.

As a matter of DOS policy, containers, which are labeled in accordance with the OSHA Hazard Communication Standard, will also be considered to satisfy the labeling requirements of the Right to Know Law. Under the OSHA Hazard Communication Standard, containers must be labeled with the name of the product as listed on the MSDS, the health hazard warnings (including target organ health effects) and physical hazard warnings (such as flammable or corrosive). Most manufacturers label containers in accordance with this Standard, since this is a Federal law applying to all private sector workplaces.

Training/Written Instruction Requirements

Employees who are or may be exposed to chemical hazards must be trained or instructed in writing annually. The initial training or instruction for new employees must be provided within 30 days of employment. A record including a description of the training given, the date of the training and the names of both the instructor and employees who received training or instruction must be kept for the duration of employment.

The training or written instruction must include a summary of the employee's rights under the law. It must also include information on how to read an MSDS. Finally, the most critical aspect of the training is informing employees of the specific hazards and safe work practices for preventing these hazards.

Posting a Workplace Notice

A Right to Know Workplace Notice must be posted in a central location at all workplaces which are covered by the RTK Law (Contact DOS at (617) 969-7177 for current workplace notices).

Employee Rights

Employees have rights under the law, which include the right to request a copy of an MSDS and in certain circumstances, the right to refuse to work if a MSDS is not provided. More detailed information on employees' rights is given on the required workplace notice and in the RTK Law and the regulations.

Law and Regulation Reference

The Right to Know Law –MGL Ch.111F (Sections 1 –21)

Division of Occupational Safety (DOS) - Workplace Regulation-454 CMR 21.00

Two other sets of regulations have been promulgated by other agencies under the Right to Know Law:

- Mass Dept of Public Health (105 CMR 670.000) (promulgated under sec. 4 – 6; 12 and 20 of Ch. 111F).
- Mass Dept of Environmental Protection (310 CMR 33.00) (promulgated under sec. 16 – 19 of Ch. 111F).

Registration of Third Party Trainers

The Massachusetts Right to Know Law provides for the registration of Third Party Trainers by the DOS. To obtain copies of the necessary documents or to obtain a list of current registrants, please contact the DOS at 617-969-7177.

Further Information

If you have questions, or, would like to ask for an inspection or consultation, contact the DOS Occupational Hygiene/Indoor Air Quality Program at 617-969-7177.

Right to Know Documents

1. Right to Know Booklet

This booklet contains all official State documents pertaining to the Right to Know Law. It includes a copy of the Law and regulations of the Division of Occupational Safety (DOS), Department of Public Health and Department of Environmental Protection. The Mass Substance List is included in the booklet. The booklet can be obtained from the Statehouse Bookstore for $7.85 plus $2.60 shipping and handling.*

2. MA Right to Know: Employer Assistance Manual

This manual reviews employers' responsibilities under the Law and is written in easily understood language. It provides a step by step process for complying with the law and provides tips for accomplishing the required tasks. It is available at the Statehouse bookstore for $6.15 plus $2.60 shipping and handling.*

2. Chemical Hazards on the Job: Your Right to Know

This booklet gives a detailed explanation of worker rights under the Mass Right to Know Law. Topics covered include Material Safety Data Sheets, container labeling, training, and filing complaints. It is available at the Statehouse bookstore for $1.75 plus $1.25 shipping and handling.*

4. Right to Know Poster

This required poster has recently been updated to provide the most current contacts for Right to Know. It is available free of charge by calling DOS at (617)-969-7177.

5. Understanding Material Safety Data Sheets (MSDSs)

This four page document explains the terms on a Material Safety Data Sheet in easy to understand language. It is available free of charge by calling DOS at (617)-969-7177.

There are two Statehouse Bookstores:

Massachusetts State House
Bookstore-Room 116
Boston MA 02133
(617) 727-2834

Secretary of State/Western Office
436 Dwight St-Room 102
Springfield, MA 01103
(413) 784-1376

The catalog and ordering information for Statehouse bookstore publications can also be accessed via Internet at www.magnet.state.ma.us/sec/spr. Documents cannot currently be ordered on line.

***Note:** The postage for any combination of documents ordered together is $3.05 for in-State shipping and handling.

SECTION 8 GLOVE BAG PROCEDURE

The glove bag consists of a 6-12 mil polyethylene bag fitted with log sleeve gloves, a tool pouch and a two-inch opening used for water application. The size, quality, style and cost vary depending on the manufacturer. Glove bags are available in many different sizes and shapes to accommodate a variety of removal situations for horizontal, vertical or other special applications.

Glovebags should only be used once, and not moved to another location to perform additional removal work, or re-used in any way.

In addition to the glove bag, several other tools and materials are commonly required to perform the project successfully. The materials, listed below, are readily available from most asbestos abatement contractor suppliers and for local hardware stores.

8.1 Specific Work Practices for Glove Bag Operations

Pursuant to 453 CMR 6.14(4)(e), specific work practice requirements for glove bag removals must be met:

1) Glove bags shall be installed to form an airtight covering over the structure to which they are applied. Any friable ACM in the immediate area of glove bag attachment shall be wrapped and sealed in two layers of six mil plastic sheeting or otherwise rendered intact prior to glovebag installation. All openings in the glove bag shall be sealed against leakage with duct tape or equivalent.

2) ACM shall be wet with amended water prior to its removal and maintained in a wet condition inside the glove bag.

3) Any ACM that has been exposed as a result of the glove bag operation shall be suitably encapsulated or enclosed so as to prevent the leakage of asbestos fibers prior to the removal of the glove bag.

4) All surfaces from which ACM has been removed inside the glove bag and the upper portions of the glove bag itself shall be cleaned free of visible debris prior to removal of the glovebag.

5) Debris shall be isolated in the bottom of the glove bag by twisting the bag to form a closure in the middle. This closure shall be taped around with duct tape or equivalent. Air in the glove shall be exhausted with a HEPA vacuum cleaner prior to its removal from the structure.

6) Following removal from the structure, the glove bag and its contents shall be containerized in accordance with 453 CMR 6.14(4)(h).

8.2 Required Materials

1. Pre-fabricated glove bag
2. Pump –up garden sprayer (2-3 gallon) with hose at least 6 feet long
3. Surfactant (amended water)
4. Duct tape
5. Pre-labeled polyethylene asbestos disposal bags (6 mil thickness)
6. Smoke tubes with aspirator bulb (with 6 inches of tubing)
7. HEPA vacuum cleaner (wiring must include a ground plug or ground fault circuit interrupter)
8. 16 inch bone saw/wire saw (flexi-saw; a serrated heavy gauge wire with ring-type handles at each end)
9. Utility knife with retractable blade
10. Hand held scrub brush (nylon bristles)
11. Several rags
12. Rewettable fiberglass cloth (a plaster impregnated fiberglass webbing)
13. Hand stapler and staples
14. Polyethylene plastic (roll of 4 or 6 mil)
15. Asbestos caution signs and labels
16. Ziplock bag (approx. 8” x 10”)
17. Ice scraper, garden towel or putty knife
18. Spray bottle (mister)
19. Scissors
20. Dual cartridge, reusable half-face respirator high HEPA filter

21. Disposable suits, booties hood or head covering

May be necessary

- Wire cutters
- Tin snips (if aluminum jacket present)
- Reinsulation material

8.3 Pre-work Procedures

Only those persons who have been trained on the use and limitations of glovebag removal projects and the basics of respiratory protection should perform the removal. It is best to have two people doing the removal. One person will perform the removal while the other one wets the material. The state requires notification prior to any removal work which involves greater than 3 linear or square feet of asbestos containing materials.

1. Check the temperature of the pipes. **Never perform a glovebag removal on hot pipes (over 150°F).** High temperatures can cause the bag or gloves to melt over the workers hands and arms. If the pipe temperature is over 150^0, the heat source to this pipe must be temporarily shut off and the pipe allowed to cool before work begins.

2. Gather all necessary materials and supplies. Rope off the work area and post asbestos warning signs around the perimeter so that other people will not enter the "restricted area".

3. Mix one ounce of surfactant with every 5 gallons of water and place in the garden sprayer and mister. (Note: check manufacturer's guidelines for mixing ratio also).

4. Duct tape 6 mil polyethylene sheeting onto the floor in the immediate work area.

5. If possible, shut down the HVAC system servicing this area. Alternatively, seal off all vents.

6. Review "Emergency Procedures" for glovebag.

7. Cut two donut-shaped pieces of rewettable fiberglass cloth. The inner diameter should be ½ inch smaller than the diameter of the pipe beneath the insulation. The outer diameter of the donut should be about 3 inches longer than the diameter of the pipe with the insulation. Cut a slit through the once side of the donut. Place both pieces in the ziplock bag.

8. Put on respirator and check fit.

9. Put on disposable full body suit and booties. **Head covering goes OVER respirator straps.

8.3 Setting up the Glovebag

8.4 Glove Bag Removal

The following attachment, entitled "Overview of the Glovebag Procedures" details the step-by step process for assembling materials, pre-work procedures, setting up the glove bag, and conducting the removal.

OVERVIEW OF THE GLOVEBAG PROCEDURES

The glovebag consists of a 6-12 mil polyethylene bag fitted with long sleeve gloves, a tool pouch and a two-inch opening used for water application. The size, quality, style and cost vary depending on the manufacturer. In addition to the glovebag, several other tools and materials are commonly required to perform the project successfully. These materials, listed below, are readily available from most asbestos abatement contractor suppliers and from your local hardware store.

Required Materials

1. GLOVEBAG
2. PUMP-UP GARDEN SPRAYER (2-3 gallon) with hose at least 6 feet long
3. SURFACTANT (i.e. 50% polyoxyethylene ester and 50% polyoxyethylene ether) or equivalent
4. DUCT TAPE (3 inch width)
5. PRE-LABELLED POLYETHYLENE ASBESTOS DISPOSAL BAGS (6 mil thickness)
6. 16-INCH BONE SAW (Flexi saw; a serrated heavy gauge wire with ring-type handles at each end)
7. UTILITY KNIFE WIT RETRACTABLE BLADE
8. HAND HELD SCRUB BRUSH (nylon bristles)
9. SEVERAL RAGS
10. REWETTABLE FIBERGLASS CLOTH (a plaster impregnated fiberglass webbing available through many insulation suppliers)
11. ZIP LOCK PLASTIC BAG (approximately 8" x 10")
12. HAND STAPLER AND STAPLES
13. POLYETHYLENE PLASTIC (roll of 4 or 6 mil)
14. ASBESTOS CAUTION SIGNS AND LABELS
15. ROPE
16. SMOKE TUBES
17. ASPIRATOR BULB WITH 6 INCHES OF TUBING
18. HEPA VACUUM CLEANER (wiring must include a ground plug or ground fault circuit interrupter)
19. WATER BUCKER
20. RUBBER DUSTPAN OR SHOVEL
21. ICE SCRAPER, GARDEN TROWEL OR PUTTY KNIFE

Required Materials continued

22. SPRAY BOTTLE (mister)

23. STRING

24. SCISSORS

25. DUAL CARTRIDGE, REUSABLE HALF-FACE RESPIRATOR with high efficiency particulate air cartridges

26. DISPOSABLE SUITS, BOOTIES, HOOD OR HEAD COVERING

May be Necessary

1. Wire Cutters

2. Tin snips (if aluminum jacket present)

3. Reinsulation Material

I. Prework Procedures

Only those persons who have been trained on the use and limitations of glovebag removal projects and the basics of respiratory protection should perform the removal. It is best to have two people doing the removal. One person will perform the removal while the other one wets the material. The Division of Occupational Hygiene should be notified prior to any removal work (617-969-7177).

1. Check the temperature of the pipes. NEVER PERFORM A GLOVEBAG REMOVAL ON HOT PIPES (OVER 150°F)! High temperatures can cause the bag or gloves to melt over the workers hand and arms. If the pipe temperature is over 150°, the heat source to this pipe must be temporarily shut off and the pipe allowed to cool before work begins.

2. Gather all necessary materials and supplies. Rope off the work area and post asbestos warning signs around the perimeter so that other people will not enter the area.

3. Mix one ounce of surfactant with every 5 gallons of water and place in the garden sprayer and mister. (Note - check manufacturers guidelines for mixing ratio also). Half fill the water bucket with water.

4. Duct tape 6 mil polyethylene sheeting onto the floor in the immediate work area.

5. If possible shut down the heating, ventilation and air conditioning (HVAC) system serving the area. Alternatively seal off all vents.

6. Review "Emergency Procedures" for glovebag.

7. cut tow donut shaped pieces of rewettable fiberglass cloth. The inner diameter should be 1/2 inch smaller than the diameter of the pipe beneath the insulation. The outer diameter of the donut should be about 3 inches longer than the diameter of the pipe with the insulation. Cut a slit through the one side of the donut. Place both pieces in the zip lock bag.

II. **Worker Protection**

1. Put on respirator and check fit. (See Respiratory Protection)

2. Put on disposable full by suit, head covering and booties. Remember - head covering goes over respirator straps.

III. **Setting up the Glovebag**

1. Check the pipe where the work will be performed. If there are areas of damaged pipe covering around the section to be removed either patch with rewettable fiberglass cloth or wrap the entire length of the pipe with polyethylene plastic and candystripe it with duct tape. A common error when doing glovebag removals is forgetting that loose pipe lagging several feet of several yards away may be jarred loose from the activity, thus generating airborne fibers. After the removal is completed, the polyethylene should be disposed of as asbestos waste and any debris cleaned up according to "Asbestos Debris Cleanup Procedures".

2. Place 2 layers of duct tape around the pipe at each end where the glovebag will be attached. (Do this by holding the glovebag up to the pipe to see the length). This serves two purposes. First it provides a good surface on which to seal the ends of the glovebag and second it minimized the changes of releasing fibers when the tape at the ends of the glovebag is peeled off at the job completion. Note - This tape will be left on the pipe after the removal.

3. With scissors, slit the top of the glovebag open if necessary, and cut down the side seams approximately eight inches longer than the pipe diameter. (Note - some brands have zipper tops and straps thus this may not be necessary).

4. Run duct tape horizontally along one of the top seams for reinforcement.

5. Place the following tools into the pouch inside the glovebag:

   1. bone saw
   2. utility knife (closed)
   3. rags
   4. nylon scrub brush
   5. rewettable fiberglass cloth (placed first in ziplock bag)
   6. If necessary - wire cutters or tin snips to cut wire hangers or aluminum jackets.

MAKE SURE ALL THE NECESSARY TOOLS ARE IN THE BAG BEFORE PROCEEDING FURTHER

6. Place the glovebag around the section of pipe to be worked on and staple the top together through the reinforcing duct tape. Staple at one inch intervals.

7. Fold the stapled section over and tape it horizontally to the glovebag with duct tape. Note - it will seal best if you use a few shorter pieces of tape rather than one long strip.

8. Lift the glovebag up so that the bottom of the pipe is flush against the end of the side slit on the glovebag. Duct tape the ends of the glovebag to itself and to the strip of duct tape previously placed on the pipe covering. **Note** - There should be adequate room at the top of the glovebag to reach over the top of the pipe. If the glovebag is not lifted up and taped there will be insufficient room to cut the top of the asbestos covered pipe.

IV. Checking the bag for leaks before removal

1. Poke a small hole through the prelabelled water hose patch (if one present) or alternatively reinforce a two-inch section of the glovebag (above and to the side of one of the gloves) with duct tape and then slice a small hole through the tape just large enough for the smoke tube end to be put into.

2. Precut a few pieces of duct tape and set aside for patching holes or leaks.

3. Holding the smoke tube down into wastebasket, carefully snap off one tip (i.e. with tin snips) of the tube and place into the tubing attached to the aspirator bulb. Eye protection should be worn to protect from stray pieces of glass. Note - the smoke is a skin and eye irritant thus avoid contact.

4. Snip off the other end of the smoke tube as described previously and place immediately into the hole, being careful not to puncture other areas of the bag.

5. Squeeze the aspirator bulb until the bag fills with visible smoke. Remove the smoke tube and place a small piece of duct tape over the hole. (Once the bag has been determined to be well sealed, place the smoke tube n the bucket of water for 5-10 minutes and then remove the tube and throw away).

6. Gently squeeze the glovebag and look for leaks. Patch all leaks with duct tape.

7. When no further leaks are found, set the HEPA vacuum to the low volume setting and turn it on. Place the vacuum hose over the hole where the smoke tube was originally for a few seconds to remove the majority of the smoke. Do not fully collapse the bag.

V. Removal

1. Insert the wand of the garden sprayer though the reinforced hole up to the handle and tape it securely with duct tape so that there are no leaks.

2. All work (except for the water spraying) will now be done through the gloves. If an aluminum jacket is present, remove with tin snips and wire cutters. Fold the sharp edges inward to prevent cutting the bag and place gently in the bottom of the bag. Be careful no to cut yourself on the sharp edges. The insulation should now be exposed.

3. Wet the asbestos material thoroughly. Holding the handles of the bone saw begin cutting through the asbestos. It may be easier to cut the bottom half first. Water should be sprayed on the cutting area and sides of the bag throughout the process to keep dust to a minimum. Do not use excessive water as this may weigh down the glovebag and cause it to pull away from the pipe. If possible the bottom of the bag should be supported (i.e. - using a chair).

**** DO NOT CUT THROUGH THE PIPE - THE BONE SAW IS EXTREMELY SHARP ****

4. Horizontally slice through the bottom or seam of the insulation from end to end with the utility knife (being careful not to cut the bag) and gently place the insulation in the bottom of the bag. Wet the material on the bottom of the bag as well as any remaining debris on the pipe.

5. Clean all debris off pipe with water, scrub brush and rags. Clean off excess debris on the exposed ends remaining on the pipe.

6. Wet the donut shaped pieces of rewettable fiberglass cloth and apply to exposed ends of asbestos being careful to enclose all visible insulation .

7. Spray down the inside of the bag and clean off the retractable knife and bone saw (also the wire cutter and tin snips if used). The rags and scrub brush should be left in the bag and thrown out with the rest of the waste since they cannot be adequately cleaned.

8. Grab the cleaned tools with one glove and invert the glove to the outside of the bag. Tie off the glove with string at two areas and cut the glove between the two sealed areas. Place the section of glove containing the tools in the water bucket. Open this glove underwater and clean all tools in the water. Remove any gross chunks of debris and place in pre-labelled asbestos waste bag. Dispose of glove in asbestos waste bag.

9. Twist the bag several time at the midsection (below the water sprayer hole) and tape it. This will isolate the containment debris in the bottom of the bag while the glovebag is removed from the pipe.

10. Carefully remove the water wand from the bag and attach the nozzle of the HEPA vacuum into the hole.

11. With the HEPA vacuum on the low flow setting gently collapse the glovebag.

12. Remove the vacuum nozzle and seal off the hole with duct tape.

13. Slip the prelabelled 6 mil bag around the glovebag (still attached to the pipe). Cut open the top of the glovebag and fold it down into the disposal bag. Do not remove duct tape attached to pipe.

14. Remove the disposal suits and place in bag. Fold the poly on the floor inwards and place in bag.

15. Twist the top of the bag and seal with duct tape. Make sure the bag is properly labelled.

16. Remove the respirator and clean (see "Respirator Protection").

(**Note** - asbestos and asbestos containing material must be disposed of in accordance with State (DEQE) and Federal (EPA) regulations. Contact DEQE for location of the nearest approved landfill).

8.5 Clean up and Decontamination

Clean tools equipment and work area using HEPA vacuums and/or wet wiping procedures.
Seal the vacuum hoses of the HEPA vac with tape over both ends if the outside of the hose is clean.
Place cleaned tools and equipment outside the work are as soon as the cleaning has been completed.
Packaged waste should be HEPA vacuumed and wet wiped before it is moved out of the work area, and placed on a sheet of polyethylene or dropcloth.

Worker decontamination

HEPA vacuum all parts of protective clothing while standing on the dropcloth.
Leave respirator in place and remove protective clothing, folding inside out as it is removed, working from head to foot.
Place contaminated clothing into a labeled disposal bag and dispose of as ACM.
Wash hands, face and respirator. Place disposable towels in disposal bag.
Remove respirator and store as specified in the Respiratory Protection Program supplied by your employer.

8.6 Visual Inspection

The aim of the visual inspection is to ensure that:

- ✓ No evidence of residue, debris, or dust is present in the abatement area
- ✓ Seals on windows, doors, and vents remain in place during final air monitoring
- ✓ Isolation barriers separating the abatement area from non-abatement areas are in place

A visual inspection involves visually examining the asbestos removal area for evidence that the abatement has been successfully completed, including thorough clean-up. The inspection is conducted in each functional space where a response action was conducted to remove, encapsulate, or enclose ACBM or material assumed to be ACBM. A visual inspection is required *regardless of the size of the project*, even if glove bags are used as the sole method of removal. Visual inspections are also an important means of determining acceptable completion of small-scale, short-duration O&M or repair operations.

The presence of any visible residue on surfaces within the abatement area indicates a need for additional cleaning of the surfaces. Clearance for a visual inspection must meet the "*no visible debris*" critera. If air sampling is required, only after visual inspection clearance has been completed may final air sampling be done. If visible dust or debris remains, it must be cleaned up using wet wiping and/or HEPA vacuuming until the "*no visible debris*" criteria has been met.

For glove bag operations or smaller response actions, this inspection could also be performed by the building owner, or an individual selected by the building owner, as long as that person is trained pursuant to state regulations [453 CMR 6.10(4)(b)(c)(g)(h)].

The American Society for Testing and Materials (ASTM) has published a "Standard Practice for Visual Inspection of Asbestos Abatement Projects" which incorporates information and guidance from both OSHA regulations and EPA regulations and guidance documents.

The results of the visual inspection should always be documented – dated and signed by the person conducting the visual inspection.

SECTION 9: OPERATIONS AND MAINTENANCE PROGRAM

9.1 OBJECTIVES

An Operations and Maintenance Program (O&M) can be defined as a formulated plan of training, cleaning, work practices and surveillance to maintain asbestos-containing materials in good condition. The principal objectives of an O&M program are to minimize exposure of all building occupants to asbestos fibers, clean up existing contamination and properly maintain the ACBM until it is removed. O&M programs are designed to prevents asbestos fiber releases or resuspension of already

9.2 REQUIRED ELEMENTS

Through the O&M plans is a method to record general renovations, previously unidentified materials may be exposed by such activities. Diligent recordkeeping can aid in the prevention of further contamination from asbestos fibers released during such renovations.

Any successful O&M program should include the following elements:

- ☐ ***Notification***: A program to tell all workers and building occupants where ACM is located and how and why to avoid disturbing the ACM. All persons affected should be properly informed.
- ☐ ***Surveillance***: Regular ACM surveillance to note, assess and document any changes in the condition of the material.
- ☐ ***Controls***: Work control/permit system to control activities which might disturb ACM.
- ☐ ***Work Practices***: O&M work practices to avoid or minimize fiber release during activities affecting ACM.
- ☐ ***Recordkeeping***: Document O&M activities, including the date, location, description of work performed, and signature of person performing the work.
- ☐ ***Worker Protection***: Medical and respiratory protection programs, as applicable.
- ☐ ***Training***: Asbestos Program Manager and custodial and maintenance staff training.

9.3 SAFE WORK PRACTICES

9.3.1 Specialized Work Practices and Procedures

The building owner must ensure that the following procedures are followed for any O&M activities disturbing friable ACBM:

- ☐ Restrict entry into the area by persons other than those necessary to perform the maintenance project.
- ☐ Post signs to prevent entry by unauthorized persons.
- ☐ Shut off or temporarily modify the air-handling system and restrict other sources of air movement.
- ☐ Use work practices or other controls, such as wet methods, protective clothing, HEPA vacuums, mini-enclosures, and glove bags, as necessary to inhibit the spread of any released fibers.
- ☐ Clean all fixtures or other components in the immediate work area.
- ☐ Place the asbestos debris and other cleaning materials in a sealed, leak-tight container.

The specific work practices that must be followed when routine maintenance activities are being conducted depend on the likelihood that the activities will disturb the ACBM and cause fibers to be released.

9.3.2 Renovation Permit System and Work Orders

One of the most difficult tasks that the building owner faces is minimizing accidental disturbances of ACBM during maintenance and renovation operations. One way to control such disturbances is by establishing a permit system where all work orders or requests are processed through the asbestos program manager. In a permit system, all requests for maintenance or renovation activities are given to the program manger before a work order to proceed is issued. The program manager then checks the O&M plan for information about the presence of ACBM where work is to be performed and physically inspects the area in question to make sure that the records reflect actual conditions. If no asbestos is present, the work order can be signed and issued. If ACBM is present, the program manager can sign the work order and then either ensure that trained maintenance or renovation workers are properly equipped to handle the ACBM or dispatch an "emergency response" team to remove the ACBM. In situations where there are large amounts of ACBM, maintenance or renovation work that does not have to be done immediately should be postponed until the ACBM in the area can be removed by an licensed contractor. The permit system should be in place for all facility maintenance work conducted by the facility staff, outside contractors, and outside short-term workers.

The work order should give the time and location of requested work, the type of maintenance needed, and a notation on the location and condition of any ACM in that work area. The program manager should visit the site to determine what work practices should be instituted to minimize the release of asbestos fibers, and record that information on the work permit. Any personal protective equipment required

should be indicated on the permit. Any ACM removed must be disposed of according to state and federal regulation.

9.3.3 Cleaning

When cleaning areas of a building where friable ACBM and suspected ACBM or significantly damaged asbestos is present, the following methods must be used:

✓ HEPA-vacuuming or steam-cleaning all carpets
✓ HEPA-vacuuming or wet-cleaning all other floors and all other horizontal surfaces
✓ Disposing of all debris, filters, mopheads, and cloths in sealed, leak-tight containers

Such areas must be cleaned prior to initiating a response action, unless the building has been cleaned using similar methods within the previous six months. That is a reason the O&M program should include the type of routine cleaning performed and the frequency of this cleaning regimen.

9.4 NOTIFICATION

A description of all notification processes is an integral part of the O&M plan. There are a variety of methods which can be used to notify building occupants and staff: electronic mail, postings on all bulletin boards, employee newsletters, notices included in payroll, etc.

The following notifications are required of schools, but should also be part of any effective O&M program:

- An **annual** notice to all workers and building occupants, or their legal guardians, of all inspections, reinspections and activities being conducted to control asbestos exposure, including periodic surveillance and asbestos removal, that are planned or in progress. A dated copy of this notification should be included in the O&M plan.

- A notice to **short term workers** (e.g. telephone repair workers utility workers, exterminators) who may come into contact with asbestos in the building, identifying the location of ACBM or assumed ACBM in the work area. This notification should be documented in the O&M plan. If these workers will be disturbing ACBM during the course of their normal duties, they must have documentation of appropriate training.

Owners should strive to establish clear lines of communication with all building occupants regarding asbestos issues. People who are informed of the presence, location and condition of ACM in a building where they work or live, and who understand that the mere presence of ACM is not necessarily hazardous to them,

can be helpful in eliminating or reducing hysteria on the part of other less informed building occupants.

If and when asbestos incidents occur, it is prudent for the building owner to deal with occupants and contractors openly and honestly to maintain his/her credibility and occupant confidence.

A notification must be submitted to the Department of Labor and Workforce Development (DLWD) before engaging in any asbestos response action which involves *more than three linear or square feet* of asbestos. This includes asbestos in or on structures or components, pipes, ducts or wires. Notification must be on the designated forms and must be received *at least* 10 days before the project start date. In the case of an Emergency Project, within one working day after the project start date. Other state, federal or municipal agencies may require notification as well, such as the MA Department of Environmental Protection (DEP).

9.5 LABELING

In routine maintenance areas of a building a warning label should be placed immediately adjacent to any friable and nonfriable ACBM and suspected ACBM assumed to be ACBM. Schools are required to post these signs under the AHERA regulation. Labels are also required under both the EPA Worker Protection Rule for public employees, and under OSHA for all private sector employees.

In service and maintenance areas (such as boiler rooms, crawl spaces, janitor closets), signs indicating the presence of asbestos will alert and remind maintenance workers or short term workers not to inadvertently disturb the material. The signs should be prominently displayed in readily visible locations, must be in print that is readily visible due to large size or bright color, and must remain posted until the ACBM that is labeled is removed. Examples of appropriate labels are provided at the end of this section.

9.6 PERIODIC SURVEILLANCE

At least once every six months after an O&M plan is in effect, the facility manager should conduct periodic surveillance in each building that contains ACBM or is assumed to contain ACBM. The surveillance does not have to be conducted by an accredited person, but it should be conducted either by the asbestos program manager person (if he/she is trained) or by someone who is appropriately trained on asbestos (such as a senior maintenance person).

Periodic surveillance involves a visual inspection of all areas that are identified in the management plan as ACBM or assumed ACBM. In evaluating each homogeneous area, the person conducting the surveillance must visually inspect all areas identified in the O&M plan as ACBM or suspected ACBM and record whether there are any

changes in the condition of the material (including if there are no changes). The date of the surveillance, the name of the person conducting the surveillance, and any change in condition of the ACBM or assumed ACBM should be documented and included in the O&M plan within a reasonable amount of time, such as 30 days from the periodic surveillance.

9.7 OTHER HEALTH & SAFETY HAZARDS

During routine surveillance, it would be prudent to take notice of any other health and safety issues such as:

- **Electrical hazards**—exposed wiring, missing outlet covers or GFCI, overloaded extension cords
- **Trip and fall hazards** – wet areas, wires or cords stretching across the work space, bolts or conduits protruding through the floor, ripped or bunched carpet, broken or missing areas of floor covering
- **Fire hazards**—missing or blocked fire extinguishers, blocked electrical panels, water dripping on electrical mains/panels, storage of materials on transformers or in boiler rooms
- **Structural components**—water damaged ceiling tiles, sagging ceilings or floors, broken windows, mold and mildew on walls, floors etc.
- **Confined space hazards** – identify confined spaces, such as crawl spaces, tanks, tunnels, etc. and have a controlled program for entry and work conducted in these areas which takes into account such hazards as collapsing walls/floors, insufficient oxygen, and the accumulation of toxic gases

9.8 Location of ACM in Your Building

9.8.1 Asbestos Management Plan

The asbestos management plan for a building or facility should be modeled after the AHERA required management plans for schools. This document should contain a survey of the building identifying locations, amounts and condition of ACM, both friable and non friable. If samples were not collected to determine the presence or absence of asbestos in any materials, the locations, amounts and condition of these *presumed* asbestos containing materials should also be documented. A blueprint or written description of these locations should be recorded in the plan.

Any response actions to remove, repair, enclose or encapsulate ACM should also be recorded in the plan. This includes documentation that the personnel who conducted the response actions were accredited, that the waste was properly disposed of, and that the appropriate air testing was conducted to ensure the area could be re-occupied.

Training of maintenance and custodial personnel who work in the building should be kept at part of this management plan. New personnel must be trained within 30 days of hire (Right to Know).

Periodic surveillance records are also part of the management plan for the buliding.

9.8.2 Emergency Contact List/Procedures

Each facility appoints a asbestos program manager who is responsible for overseeing the asbestos program and any asbestos related activities which are conducted within that building. You must be advised of:

- The name of the designated person
- How to contact that person
- The locations of ACM in the building where you work (this will also be part of the Management Plan for each school building)
- What to do in the event of an accidental or unexpected disturbance of ACM

The emergency contact list should be posted in a central location where all personnel will have access to it.

WARNING LABELS

CAUTION:
ASBESTOS.
HAZARDOUS.
DO NOT DISTURB
WITHOUT PROPER
TRAINING &
EQUIPMENT

FIBER RELEASE ESPISODE
RESTRICTED ENTRY

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL
ONLY.
RESPIRATORS AND
PROTECTIVE CLOTHING
ARE REQUIRED IN THIS
AREA.

FORM B

ACTIVITY/PROJECT RECORD

Project No. ______ Form No. B-

Measure or Action: ____

____

If Periodic Surveillance or Reinspection, Record Form No(s). ____________________

Start Date: ____________________ Completion Date: ____________________

ACM Type: Check Appropriate Material Type; see appropriate ACM Table or Summary)

F - Friable								
NF - Nonfriable	F/S		______		F/M		______	
S - Surfacing		NF/S		______		NF/M		______
T - Thermal		A/F/S		______		A /F/M		______
M - Miscellaneous		A/NF/S		______		A/NF/M		______
A - Other ACM	A/T		______		NF/O		______	

ACM Description: ____________________ Homogeneous Area: ______________

Specific Area Location(s): ____

ACM Location in Area(s): ____

HVAC Supply: Passive Direct Air Movement: High Moderate Low

Air System: Shut Down Isolated Not Present

Was Area Isolated? Yes No Proper Signs Posted? Yes No

Project Description and Methods: ____

____

____

____

Why was action taken? ____

____

____

Was Project Resultant of a Major Fiber Release Episode (> 3 feet)? Yes No

Was Project Resultant of a Minor Fiber Release Episode (< 3 feet)? Yes No

SPECIFIC WORK PRACTICE REQUIREMENTS FOR SPOT REPAIRS

(a) Any removal, enclosure, or encapsulation of asbestos or asbestos containing material, where such activity involves or disturbs less than 3 linear feet of asbestos surface on pipes or ducts or less than 3 square feet of asbestos surface on structures other than pipes or ducts shall be performed only by persons certified under 453 CMR 6.05 or 6.06, except as provided in 453 CMR 6.03(33)(b).

(b) All employees who perform spot repairs or who are potentially exposed to asbestos shall be provided with appropriate respirator protection and personal protective clothing, and other protective equipment as perscribed by OSHA Asbestos Regulations 29 CFR 1926.58 USEPA Asbestos Regulations 40 CFR Part 763,Subpart G and by 453 CMR 6.15. Persons performing spot repairs shall wear a half mask dual cartridge HEPA-filtered respirator as the minimum level of respiratory protection.

(c) Spot repairs shall be performed in such a manner as to minimize the release of asbestos fibers. The following work practices are minimum requirements for spot repairs under these regulations.

1. All persons excepting those who are directly involved in the work operations shall be excluded from the work area. Physical barriers shall be used, where necessary, to limit access to the work area for the duration of the project.

2. Airtight barriers shall be constructed to insure that asbestos fibers released during abatement activities are contained within the work area. Glove bags are permitted in place of a barrier for removal or repair of asbestos containing materials located on pipes and ducts.

3. Before any asbestos material is handled or disturbed it shall be wet with water to which a surfactant has been added. All asbestos material shall be kept wet throughout the work operation until it has been properly containerized.

4. Any friable asbestos material that has been exposed as a result of the spot repair operation shall be suitably enclosed or encapsulated in accordance with 453 CMR 6.14(2)(c)5 and 6.14(2)(c)6.

5. HEPA vacuuming or wet cleaning shall be used to decontaminate the work area and any equipment used in the work operation until there is no visible debris.

6. Asbestos-containing waste shall be containerized, transported, and disposed at an approved facility in accordance with 453 CMR 6.14(2)(g).

ACRONYMS

***ACM*:**	Asbestos-Containing Material
***ACBM*:**	Asbestos-Containing Building Material
***AHERA*:**	Asbestos Hazardous Emergency Response Act
***ASHARA*:**	Asbestos School Hazard Abatement Reauthorization Act
DP:	Designated Person
***DEP*:**	Department of Environmental Protection
***DOT*:**	Department of Transportation
***EPA*:**	Environmental Protection Agency
***HEPA*:**	High Efficiency Particulate Air
***HVAC*:**	Heating, Ventilation and Air-Conditioning
***LEA*:**	Local Education Agency
***MAP*:**	Asbestos Model Accreditation Plan
***NESHAP*:**	National Emission Standard for Hazardous Air Pollutants
***NIOSH*:**	National Institute of Occupational Safety and Health
***O&M*:**	Operations and Maintenance
***OSHA*:**	Occupational Safety and Health Administration
***PCM*:**	Phase Contrast Microscopy
***PLM*:**	Polarized Light Microscopy
***SSSD*:**	Small Scale, Short Duration
***TEM*:**	Transmission Electron Microscopy
***TSI*:**	Thermal System Insulation
***VAT*:**	Vinyl Asbestos Tile
***VOC*:**	Volatile Organic Compounds

[iii]

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[i] Updated 12-10-99

[ii] Updated 12/14/99